THE TRADE REVIEW

AND WESTERN MACHINIST.

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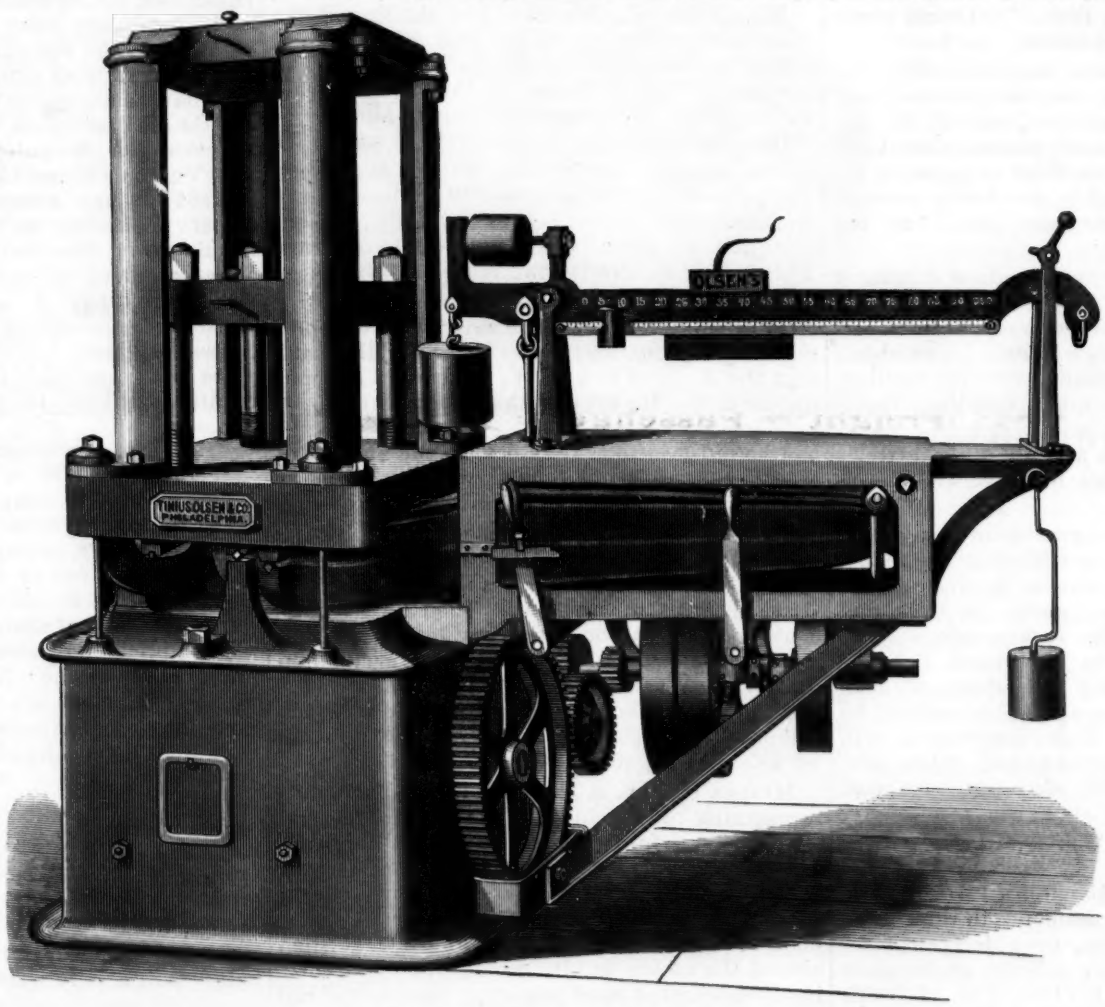
New Machinery.

Olsen's New Testing Machine.

The illustration on this page represents Olsen's new testing machine, with improvements and additions necessary for large capacity machine. The illustration is drawn from a machine of 200,000 lbs. capacity. In this machine screws and gearing are used for applying the power, securing the feature so much desired of giving a perfectly straining power free from shocks and sudden impulses. The arrangement does not get out of order and is always ready for use. The machine allows for a very wide range of tests, such as tensile, compression, and transverse tests, without any extra expensive additions, and is in position to test either with equal facility. All the parts of the machine are easily accessible and above floor line. It is self-containing, so no particular foundation is required, only a floor strong enough to support the weight of the machine itself. The machine is easily operated, and under perfect control of the operator. The straining power which may be taken from a line of shafting, or any other sources of power, is communicated through the pulleys and gears, seen in the cut on the outside, to the main gears inside the drum or base, which contains four gears operated by a central pinion. This gear operates the nuts on the four pulling rods, to which is secured the lower traveling cross-head. This latter can readily be observed at the upper ends of said rods. This cross-head traverses the whole distance between the top cross-head and the table. Any pressure brought to bear upon the table, which rests on scale levers, will be communicated by the said levers through another intermediate lever to the beam, where the pressure is balanced and registered. Tensile tests are secured by one end to the top cross-head and by the other to the travelling cross-head. Pulling in the specimen produces pressure upon the columns, and hence pressure upon the table. Compression tests are placed directly upon the table and the traveling head forced down upon the specimen. Transverse tests take place in the same manner as compression, the specimen being placed upon the table on a couple of blocks a certain distance apart, and the traveling cross-head brought to bear upon the cross-head in the center. Different rates of speed are obtained to suit the different classes of work, as well as quick return motion, or quick movement for the traveling cross-head in adjusting same for the specimen. The improved ball and socket bearing wedge tools are employed, securing on all classes of tensile specimens a perfect central pull. All shocks and jars, resulting from the breakage of specimens, and which in earlier constructed machines have had a tendency to injure the knife edges on the levers, is here obviated by an arrangement of spring cushions, which prevents the hammering on the yivots. This machine, of different sizes, is now in use among a great many leading manufacturers and technical institutions, and other public institutions of learning. Messrs. Tinius Olsen & Co., Philadelphia, Pa., who are the manufacturers of the above described machines, manufacture also all special machines in the same line, such as machines for testing springs, cement, wire, chain, etc. They have obtained the medals of merit at Cincinnati and Atlanta, as well as at the late Railway Exposition in Chicago.



OLSEN'S NEW TESTING MACHINE.

SOME INTERESTING FACTS.

Steel versus Iron for Machinery Purposes.

In the course of a discussion before the German Society of Engineers at Aix-la-Chapelle, Herr Andre gave the following instances of the failure of steel to take the place of iron, notably for heavy machinery:

Two years ago, we replaced the iron shaft of a high-speed steam engine by a Bessemer steel one, manufactured at works which for such articles stand almost, if not quite, equal to Krupp and Bochum. After two years' work, the shaft broke suddenly when moving very slowly, and without any load attached (the train of rolls was not coupled). We were about to replace it with another Bessemer shaft of mild steel, when the manager of the steel works himself advised us to return to the old material if there was any risk of the shaft becoming occasionally heated while working; for, he said, strong cooling appliances were then brought at once to bear on the shaft, which produced microscopic cracks on the surface, and these, in a short time, might produce an unexpected breakage. In order to confirm this, he (the speaker) telegraphed to ten wire works where similar engines were in use, and found that the majority employed and preferred iron. It appears, therefore, that iron shafts are again replacing the steel ones which had superseded them for quick and heavy work, where there is any risk of heating. This was further confirmed by the foreman of engine works on the Rhine, who stated that in two years they had had five breakages of heavy steel shafts, and had in each case replaced them with iron. In one of these steel shafts, of 15.75 inches diameter, a hole as large as the fist was found, and in it were two small steel balls, which had ground themselves quite round and smooth in the two years. As mild steel is even more inclined to form bubbles than hard, it seems to be, at present, even less adapted for heavy shafts and pieces.

It appeared to be as little adapted for steam boilers. The same engineer, for example, had informed him that a boiler he had constructed cracked right across the bottom when removed from the workshop to the survey yard, although great care had been taken in riveting and drilling the holes.

The constructor should remember also that "mild steel" is a very vague term; and it is necessary to ascertain where and by what process it is made. Nothing can be determined by the amount of carbon it contains; for, although one can estimate approximately, according to the carbon contained, the materials produced by a certain process at certain works, it is impossible to compare the productions of different works, especially where different processes are adopted. For example, Thomas steel, containing from 1 to 1.5 of carbon, may be exceedingly soft, while Bessemer steel, containing the same amount, may be so hard that a knob occuring on a thin wire rod can hardly be rolled away.

The differences in Thomas steel itself are very great, and although Mr. Andre could speak very favorably of it from personal experience, there were many complaints of inequalities. If an engineer, therefore, resolves to have no mild steel, but only ingot iron, he will find the border line between the two so confused that the following definition may be looked upon as a necessary expedient. "No material capable of considerable hardening shall be called iron," and, if narrowly examined, it will be seen that a great deal of the ingot iron specified as "incapable of considerable hardening," is nevertheless, capable of very considerable hardening under certain circumstances, such as a sudden cooling of a heated shaft. This "inconsiderable hardening" is just sufficient to shrink the surface, produce tension, small cracks, and finally breakages.

The English technical journals have, with a suddenness that savors of an interested inspiration, discovered that the attempts to recover sulphur in the alkali manufacture have proved a failure both in England and in Germany. They hail this as a great piece of good news for the Pio Tinto, Tharsis, and other pyrites companies whose stocks, we presume, are to be boomed on the strength of it. While it would be a matter of considerable interest to American pryrites miners to see their Spanish rivals busy filling European orders, it is well for them not to be misled by the statements now given out. The great danger which threatens their prosperity is not the recovery of sulphur from the waste, but the abandonment of the Leblanc in favor of the Solvay process.—[Engineering and Mining Journal.

Manufactures.

CLEVELAND.

THE Union Rolling Mill Co.'s works have started up after a short shut-down for repairs.

THE Chisholm Steel Shovel Works, which have been shut down for repairs, resumed last Wednesday.

THE Crucible Steel Works report that business has picked up considerably within the past few days.

THE Newburg blast furnace, which has been idle for several months, has been bought by the Union Rolling Mill Co. It will be started up some time next week.

THE Brush Electric Co. are shipping considerable machinery to Rochester, N. Y., to enable the local Brush company their to fulfill its extensive electric lighting contract.

THE Murgatroyd Freight Transmitter, which has been in operation at the N. Y., P. & O. Railroad coal docks, has been accepted by that company. We expect in the near future to describe this transmitter, by the aid of illustrations.

MR. WALKER, of the Walker Manufacturing Co., has been East looking after heavy machinery for use in the works. The firm is at present busy getting out plant for electric stations belonging to the Brush Electric Co. In one station they are putting in four 500-horse power engines, with all the connecting machinery.

THE Sayles & Anderson Manufacturing Co., of which A. T. Sayles is president, Robert Sanderson secretary and treasurer, and J. B. Anderson superintendent, made an assignment last week. This company has been engaged in the manufacture of brass goods, on Jones avenue, West Cleveland. Assets and liabilities not stated.

THE incorporators of the Standard Lighting Co., of Cleveland, are F. L. Olcott, Z. Davis, W. B. Blake, George Worthington and S. T. Everett. The capital stock is $50,000. The object of the company is the manufacturing, selling, and renting of plate and tip gasoline vapor burners, lanterns, chandeliers, torches, lamp posts, soldering furnaces and all other articles pertaining to lighting and heating with gasoline and other products.

A new Cleveland enterprise is the Lake Shore and Sunday Creek Coal and Mining Company, capital stock $200,000. Silas R. Bartlett, Anson Bartlett, Forest O. Snow, Charles B. Coit, and James L. Noonan are the incorporators. The principal office will be in Cleveland, but the business of manufacturing and mining of coal, iron ores, and other minerals will be carried on in Perry County, O. This corporation will manufacture iron, fire bricks, and other products of fire-clay, and will also purchase coal and mineral lands and such other necessary real and personal property to carry on the business.

AN Associated Press dispatch (July 28) from Chicago says: Judge Drummond, in the United States Circuit Court today, gave judgment for $82,000 in favor of Rhodes & Brady and against the Cleveland Rolling Mill Co. The plaintiffs contracted to deliver the Rolling Mill Co. 8,000 tons of iron ore during the season of 1880 at $45 per ton. When one-half of the amount had been delivered, the price of iron ore had fallen, and the company informed the plaintiffs of their refusal to accept the additional ore at the contract figure. The plaintiffs made the company a tender of the remaining amount, and the Court granted judgment for the difference between the contract price and the market price of iron ore on the date of the tender, or $18 per ton. An appeal was granted.

THE foundations for Wright & Knauff's new buildings are already commenced.—The puddlers at the Ætna mill started work again last Monday morning. On Thursday morning the other departments were all started up again.—The Newburgh Furnace Company, at the Crossing, sold their blast furnace on Thursday, to the company operating the Ætna mill.—The Hercules Powder Works buildings are now undergoing repairs. The building in which nitroglycerine is to be manufactured when the works start up again, will be located further down into the gulley, and will be surrounded by enbankments. The building will be set in the side hill.—[South Cleveland Advocate.

OHIO.

THE gas well at the Jefferson Iron Works, Steubenville, is down 435 feet.

THE Jefferson Iron Works, Steubenville, are making extensive repairs.

THE pay roll of the Warren Machine Works amounts to $1,200 per month.

THE Girard Iron Co., which has been idle for some time, blew in last Monday.

STEUBENVILLE foundries and machine shops are all reported doing a good business.

THE business of the Falcon Nail Co, Niles, are fast improving and an enlargement of their works in the near future.

J. W. WILLIAMS & SON are arranging their machinery for manufacturing pruning tools on a large scale.—[Chagrin Falls Exponent.

THE Victor Stove Co., Salem, have erected an extensive three-story addition to their large stove works, making it one of the largest in the State.

THE Hydraulic Elevator Manufactory of Warren Warner, on Eighth street, Cincinnati, opposite Crane, Breed & Co.'s, and adjoining the Blymer Manufacturing Company, was damaged by fire last week.

MR. THOS. P. CORDREY has purchased the Ohio paint works, on West Oak street, and is fitting up the buildings for the manufacture of his patent Rotary Dumping Car. He expects to be ready for operations next Monday.—[Masillon American.

THE Buckeye Engine Co., Salem, last week shipped one of their large 56x30 engines to the Hartman Steel Co., at Beaver Falls, Pa., the engine and fly-wheel weighing nearly 50 tons. They will ship, shortly two more nearly as large to the same company.

THE Hubbard Enterprise says: It is now proposed by a prominent iron man in Hubbard that the A. A. of I. & S. W. take hold and put up the mill. He argues that there are 20,000 members in the association, and that each one can be induced to take stock to the amount of $5—25 cents to be paid each week until the $5 stock is paid in.

THE old Westerman furnace has been raised to a height of 75 feet and is ready to blow in.—Fanny furnace is making a large amount of Bessemer iron of unusually good quality. It contains less than one per cent. of silicon, and what is termed 38 in phosphorus. —It is rumored that W. R. Wadsworth, of the Hubbard Enterprise, is quietly engaged in organizing a stock company to purchase and operate the Hall iron works.—[Youngstown News-Register.

MESSRS. STILLE & DUHLMETER of Cincinnati, in selecting the machinery for their new factory, were very careful to get the best machinery that money could buy—this being the second factory they have fitted out. The well-known manufacturers of wood-working machinery, Cordesman & Egan Co., of Cincinnati, furnished almost the entire outfit, which included their justly celebrated sand-papering machine, scroll saws, band saws, tenon machines, friezers, shapers, moulders, cut-off saws, dovetailing machines, jointers, hand planers, wood lathes, universal rip and cross-cut saws, saw arbors, pulleys, &c. Their machinery is finished in extra good taste and will be ornamental as well as useful and labor saving.

THE puddling department of the Westlake rolling mill is not running. The ten inch mill is running steadily.—Work is going on briskly at Griswold's oil mill. Their new Porter-Allen engine has arrived from Philadelphia, and will be placed in position next week. It weighs 9,000 pounds, and has 85 horse power.—Twenty hands are now employed at the Warren Machine Works. They shipped a large engine, 60 horse power, to Dewey & Reeder, of Kinsman, on Friday. A belt mill has been built for Tennessee parties. They are fitting up shafting, hangers and pulleys for Griswold's oil mill. Trade is better than last year; prospects for fall good. A bolting mill is being built for Windham parties. In the foundry, grate bars and boiler fronts are being made for Reeves Bros., of Niles. Repairing mowing machines keep them busy.—[Warren Chronicle.

IN GENERAL.

THE Dean Brothers steam-pump works, of Indianapolis, have just shipped two large double plunger mining pumps to coal mines in Alabama.

THE American Brake Company have moved all of their offices to their new works at the corner of Second and Webster streets. Their works they are now running right along, turning out from seventy-five to 100 sets of engine brakes a month. Their latest contract is for the equipment of a large number of fruit cars with brakes to run in express freight trains on Southern roads.—[Age of Steel, St. Louis.

THE Rochester Machine Tool Works have purchased the shop, patterns and plant of Geo. B. Brettell, Rochester, N. Y., the intention of the company being to continue the building of iron planers and other machinery. The new company organized July 7 by the election of Elias Mapes, President; John Buckley, Vice President; Edwin R. Bryant, Secretary, and George W. Davison, Treasurer. Mr. Brettell still holds a pecuniary interest in the business.

IN a recent review of the industries of Springfield and Westfield, Mass., we find an appreciative sketch of the Vitrified Wheel Co., manufacturers of vitrified emery and corundum wheels, rubstones, etc., of which the following is of interest: Like many other manufacturing establishments this one was started in a small way, but now commands an annual sale of over $50,000 for its products, the goods being in demand throughout the United States wherever metal is worked; the company also enjoys a large foreign trade. The Vitrified Wheel Company was established in 1864; it has a capital of $60,000, and its officers are among the best known business men of this town; President, H. J. Bush, who is also Vice President of the American Whip Company; Treasurer, A. L. Bush; Secretary, L. H. Pease. The company's plant consists of a three-story brick building 80x40 feet in dimensions with an "L" 35x35 feet, where every facility is at hand for the production of superior goods.

The "Nonpareil System" of Letter-filing.

The need of a compact, comprehensive and easily handled system of indexing and filing letters, invoices, or papers of any description has long been felt by business and professional men. Various schemes have been brought forward, but most of them have been put aside as too complicated or cumbersome for every-day, practical use. The "Nonpareil System," which we have before us, is a new candidate for public favor, having just come with a specimen lot from the binder's hands. It is the product of much study and a keen appreciation, from actual experience, of the needs of business men, on the part of Mr. M. S. Tracy, of Youngstown, Secretary of the Hot-Polished Shafting Co., and is brought out under the auspices of the Humanitarian Invention Association, to which reference was recently made in these columns. It is, at first sight, in the form of the ordinary ledger index, only larger. The index proper is somewhat more complete than the kind in ordinary use, extending to the second letter, as Ba, Bo, Ka, Kl, Sa, Se, Sn, etc. The pages are ruled, by blue, red and black lines, into longer spaces for names and addresses; rectangular spaces for numbers to correspond with those on the letters or papers filed, and squares, one for receiving the date of the receipt of the letter, the other for the date of the answer. All that needs, then, to be done for filing a letter or invoice is to fold, number and file it; enter the name and address and the two dates, in their appropriate places, and the record is complete. It will thus be seen that the letters, etc., are filed by number instead of alphabetically, saving a search among a number of the same initial; that it preserves the address of the correspondent; that it gives the date of reply, which can be used in referring to the copying book without further indexing; that by reason of its convenient size the file may be kept on the desk for ready reference, and finally that it is comparatively inexpensive. We take pleasure in heartily recommending the "Nonpareil System" as at once cheap, ready and complete.

Contracts and Construction.

[Under this head the TRADE REVIEW proposes to summarize various large contracts to be let within easy range of Cleveland, to the end that its advertisers, both at home and abroad, may be informed and be thus enabled to put in bids for different parts of the work in which they may be interested. If purchasing agents of railroads and of other large corporations will forward their invitations for proposals, the REVIEW will put them in shape and publish the same gratuitously. Mention the TRADE REVIEW in writing to parties for further information.]

WAYNE, IND., is to have water works.

FREEPORT, ILL., is to have new union railroad depot.

CUYAHOGA FALLS, O., is to have a Catholic church.

FOSTORIA, O., Methodists are putting up a $25,000 Church.

WATER works are to be built at Ionia, Mich., and Fairfield, Wis.

WILLOUGHBY, O., Presbyterians are to erect a new church edifice.

THE insane asylum now in process of erection at Topeka, Kansas, will cost $190,000.

THE citizens of Dayton, O., are urgently agitating the subject of a new union depot.

NEW hotels: At Jamestown, Dak., $40,000; at Sanborn, Dak., and at Carrington, Dak.

CAPITALISTS in Ptttsburgh propose locating a large stove works in Sharon, Pa., if sufficient inducements are offered.

THE Commissoners of Trumbull County, O., have decided to erect a new Infirmary building, 42x55, two stories and basement, with modern improvements.

THE Springfield Iron Co., in Springfield, Ill., has just completed an addition to its mills 90 by 110 feet with a wing 45 by 90 feet. This contains a plate mill for rolling steel plates for boilers and other purposes.

AT the last meeting of the Cleveland City Council, City Civil Engineer Morse submitted his revised estimates on the proposed high-level roadway across the Flats, as follows: From Ohio street to Lorain street hill, 3,200 feet, $675,500; from Ohio street to Jennings avenue hill, 3,100 feet, $638,000; from Merchants avenue to Ohio street 3,060 feet, $665,000.

NEW churches: At Muskegon Mich., German Catholic; at Grand Rapids, Mich., Holland Reformed; at Flint, Mich., Presbyterian; at Florence, Ks., Baptist; at Hanover, Mich., Quaker; at Benzonia, Mich., Congregational; at Keokuk, Ia., Episcopal; at Huron, Dak., Methodist.

THE building committee of the Dakota Capitol Commission have sent out notices to architects inviting them to furnish plans and specifications, accompanied by estimates not to exceed $200,000, for a brick capital brick building, at Bismarck, to be erected upon stone foundations.

RECENT Ohio incorporations, with capital stock: City and Suburban Telegraph Association, Cincinnati, $2,500,000; Ohio Tile Co., Richland County, $5,000; Centerburg Manufacturing Co., Centerburg, Knox County, $20,000; Standard Lighting Co., Cleveland, $50,000; Lake Shore and Sunday Creek Coal and Mining Co., Cleveland, $200,000; Kingsville Handle Co., Kingsville, $2,000; Kauffman Buggy Co., Miamisburg, $50,000.

M. FERDINAND DE LESSEPS has informed the French Academy of Sciences that the Suez Canal Company have determined to cut a second canal through the isthmus of Suez to be able to cope with the traffic, which is increasing from day to day to an extent hitherto unprovided for. In the meantime it is intended to make up for the deficiency by letting ships pass at night as well as during the day. Hitherto, however, it has been found impossible to hit on a satisfactory method of lighting the canal. Instead of the ships having to carry electric lamps it is in contemplation to put up electric light houses on both shores. M. de Lesseps now seeks the co-operation of electricians who are members of the Academy of Sciences, to help him by information and hints likely to ensure the success of his enterprise.

CLEVELAND'S LUMBER TRADE.

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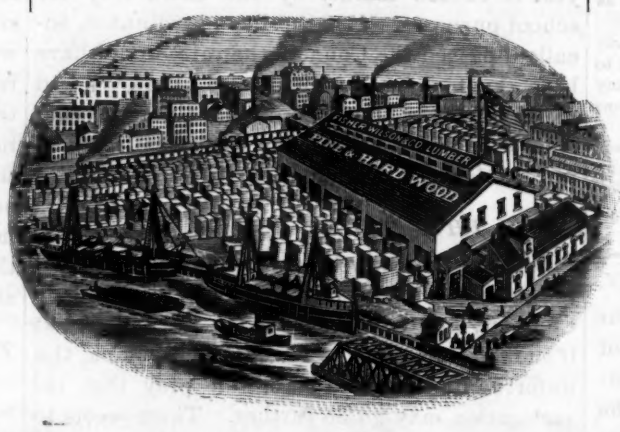
The Extensive Yards of Fisher, Wilson & Co.

To fully appreciate the importance of Cleveland as a lumber market one needs to look down upon the Flats from some such commanding outlook as the brow of Ontario street hill. Spread out before the observer are acres of lumber, while along the circuitous lines of docks is to be seen barge after barge discharging its bulky cargo. Ranked according to business actually done, Cleveland stands next to Chicago among the cities along the chain of lakes. Buffalo, by reason of her being the chief distributing point to the East for the Albany and Tonawanda region and much of the lake trade, shows larger figures as to lumber handled, but the mere receiving and transshipment of a commodity are no indices of the actual business importance of a place, and so it is as between Buffalo and Cleveland. Comparing the volume of Cleveland's lumber business this year with that of last, it may be said that it is in excess of the aggregate of 1882, while the outlook for the Fall trade is excellent—indeed, was never better.

Conspicuous for the extent of business transacted as well as for its rapid growth from com-



paratively small beginnings, is the firm of Fisher, Wilson & Co. As at present constituted, the firm consists of N. D. Fisher and H. V. Wilson, both men of large experience and excellent business judgment. Mr. Fisher was formerly a partner of R. Botsford and Mr. Wilson was with Potter, Birdsall & Co. Both have been actively engaged in the lumber business since 1866. So steady has been the increase in their business, since the formation of the present partnership in 1879, that the firm now have three large yards, as follows: No. 1 (illustrated in the accompanying cut) has a river frontage of 193 feet and No. 2, 300 feet. No. 3 is simply for storage and has no dock. At No. 1 they have an immense building 150x260x65 with a storage capacity of 1,500,000 feet of lumber, while the combined storage capacity of their three yards is 15,000,000 feet. Their average stock on hand is about 10,000,000 feet. They expect to receive this season up to its close, December 1, about 30,000,000 feet, as against 25,000,000 feet last year.

To handle this immense quantity of lumber a small army of men and horses and quite a fleet of vessels are employed. The firm is part owner of the steamer Benton and tow (four barges) which bring from the mills of Michigan to their yards about 1,200,000 feet of lumber a week, making the round trip in about eight days. On the pay-roll of the firm, during the Summer season, are 75 to 125 men, while 42 horses are now kept constantly employed. Prompt delivery is one of the features of the firm, they having facilities for delivering and shipping 200,000 feet a day. During June they delivered nearly 4,000,000 feet.

Their business is not only in rough lumber, but they have an extensive trade in dressed lumber, windows, sashes, blinds, shingles, lathe and hardwoods. In dressed lumber they are carrying over 500,000 feet in stock and expect to increase it to over 1,000,000. This work is done by contract, keeping four planing mills constantly busy. They are also largely supplying railroads and car shops—a very steady and desirable branch of their business. Thirty million shingles and not less than 10,000,000 lath will be handled by them this year.

Their shipments are very extensive. Besides their local trade, which last year amounted to $180,000, they ship to cities all along the Eastern seabord, to points in New England, to Philadelphia and Baltimore, Pennsylvania, West Virginia, Ohio and Eastern Indiana. All in all, the firm of Fisher, Wilson & Co. takes leading rank among the extensive lumber dealers of Ohio and along the line of the lakes—a position which Cleveland is proud to have them so successfully hold.

Coal and Ore.

THE Mountain shaft, near Massillon, will be opened up soon after eight months of idleness.

THE Northwestern Coal & Iron Co., $250,000 capital, will mine in and around New Castle, Pa.

A 4½ foot vein of coal has been struck at a depth of 44 feet, at Averick's bank, near Steubenville.

THE principal part of the $500,000 stock of the newly organized Wilmot Mining Co., of Ontanogon, Mich., is held by Calumet, O., and Carthage, O., parties.

MINERS pay-rolls at Massillon last pay-day aggregated as follows: Sippo Coal Co., $6,000; Howells Coal Co., $8,000; Elm Run and Windsor, $7,000; Rhodes & Co., $9,000.

THE largest load from Marquette to Cleveland, 5,120 gross tons, was carried by the barge Specular, Captain Tower, on her last trip for the Republic Iron Co.—[Marine Record.

A STEUBENVILLE correspondent of the Pittsburgh Telegraph writes: When all of the mines are at work not less than 1,000 men and boys are employed in and around the mines—coke burners, drivers, &c. Now, I believe, not more than 100 is at work.

ALL the working force of the Republic mine, Marquette county, Mich., 400 men, including six bosses, struck Wednesday for restoration of wages which were cut 12½ per cent two months ago. The Republic mine is the property of the Republic Iron Co., of Cleveland.

THE Ohio Coal Commission, it is reported, is making little or no headway. This commission was organized to investigate numerous complaints by miners and was empowered to take testimony. Though hundreds of anonymous communications have appeared in the newspapers during a year or most past, the conmission has been unable to secure witnesses. It has visited many mining regions but the miners have not appeared before them thus far, and the prospects are that the tour will end in nothing.

From the Marquette (Mich.) Mining Journal.

IT is reported in the Menominee Range that the Mastodon Mining company has closed a sale of 20,000 tons of ore for delivery at Cleveland—price not given.

THE Mining Journal is informed that Mr. Jos. Sellwood, of Ishpheming, with the Messrs. Pickands and Mather, of Cleveland, will at once engage in a thorough exploration of the Pacific company's tract, adjoining the Seymour property, these gentlemen having taken hold of the same with the intention of developing a paying mine there if the size of the ore body does not disappoint their expectations.

AT this date last year there had been shipped from the port of Escanaba 150,132 gross tons more ore than the shipments thence this season; from Marquette 250,213 tons more, and from St. Ignace 4,612 tons. L'Anse is the only part of the district whose shipments to date for the current season show an increase over the corresponding portion of last, the excess in favor of the present season in her case being 1,349 gross tons.

DESPITE the dullness in certain lines of trade, there can be no question that the country generally is in a prosperous condition. The business "probabilities" show no signs of a storm-center gathering in any direction.

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To Machinists, Manufacturers and Others.

THE publishers of the TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinists and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

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MANUFACTURES AND TAXATION.

Force is added to the recent remarks in the TRADE REVIEW relative to the unwisdom of levying burdensome municipal taxes as resulting in the driving out of manufactures, by the publication in the *Herald* of the taxable valuations of the corporations of Cleveland. The largest tax-paying corporation in the city is, of course, the Standard Oil Co, whose valuation is put at $389,590. Next in order is the White Sewing Machine Co., $235,450, while the following pay taxes on property valued at $100,000 and less than $200,000: Brush Electric Co., Cleveland Rolling Mill Co., Cleveland Provision Co., Cleveland Transportation Co., and Western Union Telegraph Co. The following pay on valuations ranging from $50,000 to $100,000: Commonwealth Iron Mining Co., Mercantile Insurance Co., Otis Iron and Steel Works, and Union Steel Screw Co., and the following between $25,000 and $50,000: Cleveland Telephone Co., Cleveland Gaslight and Coke Co., Cleveland Linseed Oil Co., Lake Erie Iron Co., and Meriam & Morgan Paraffine Co. Of those whose property is assessed at from $10,000 to $25,000 are the following: Austin Powder Co., American Express Co, A. S. Herenden Furniture Co., Britton Iron and Steel Co., Brush Electric Light and Power Co., Cleveland Iron Mining Co., Cleveland Malleable Iron Co., Cleveland Non-Explosive Lamp Co., Cleveland Hardware Co., Cleveland Paper Co., Cleveland Burial Case Co., Cleveland Baking Co., Cleveland Bridge and Car Works, Cuyahoga Steam Furnace Co., Forest City Varnish, Oil, etc., Co., Fuller, Warner & Co., Murphy & Co., Marsh & Harwood, Ohio and Pennsylvania Coal Co., Union Rolling Mill Co., and Union Express. There are also 70 corporations paying taxes on valuations less than $10,000, and the total valuation of the 105 corporations included in the list is $2,274,819.

The tax-rate last year, we believe, was $2.48 per $100. According to this, the Standard Oil Co. paid in taxes, $9,663.83. This year, if we mistake not, the rate is $2.78 per $100. Applying this to the Standard Co.'s valuation, we find that they will this year pay $10,730.60, an increase over last year of $1,066. While it is true that this corporation is abundantly able to stand the increase, how is it with smaller concerns? A corporation whose valuation is $100,000 and which last year paid $2,480, will this year have to pay $2,780, an increase of $300; one whose valuation is $50,000 and which last year paid $1,240, will this year have to pay $1,390, an increase of $150, and one whose valuation is $25,000 and which last year paid $620, will this year have to pay $695, an increase of $75. It will not do to say that these are inconsiderable figures with concerns doing a business of thousands or hundreds of thousands a year, for too often they represent the bare margin of profit which a dull season or a low range of prices enforces. Municipal improvements are a good thing, but municipal extravagance is quite the contrary, and the TRADE REVIEW, while zealously advocating the former, cannot but deprecate the latter, in view of its paralyzing effect upon all legitimate enterprise. The high rate this year is caused mainly by the extra levy for school purposes. Had the Bayne ordinance, so-called, passed the Council, the rate would have been kept down to $2.54; so that, viewed merely from a business standpoint, we consider that the Council made a serious mistake in rejecting the ordinance.

THE NILES FAILURES.

It is yet too early to arrive at an unbiased judgment as to the failure of the Ward Iron Company and L. B. Ward & Co., of Niles, but if the developments so far can be relied on, the unfortunate assignors may well pray that investigation may go no further. There seems to have been a running down at the heel in general. It would be a charity to conclude that this deplorable state of affairs was attributable solely to the carelessness and incompetency of the managers, were it not for the distinct assertion that it has been the custom of James Ward to raise money on the credit of the Falcon Iron Co., unknown to the latter, and that the trick was only detected by his failure to take up a note before due. That such underhanded means of obtaining credit must sooner or later be discovered was inevitable. It is only unfortunate that the finale did not come sooner. Not the least reprehensible feature of the affair was the failure to provide for the $18,000 in wages now owed to the ill-starred employes, who, it is now hoped, may yet be paid in full. Whether upon this has been piled the additional injustice of placing Mrs. Ward's interest practically beyond the reach of creditors remains yet to be seen. The blow is a sad one for the thriving town of Niles, but is not so bad as that of 1873. It is to be hoped that Messrs. Cleveland, Brown & Co., of this city, owners of the site, may see their way clear to carry out their reported intention to take the mill and run it on a business basis. It would certainly be a good thing for Niles, whatever the benefit to the owners might be.

INGENUITY AMONG MECHANICS.

We presume no class of men are called upon to exercise the gift of ingenuity so constantly as mechanics. In business or professional life there are certain well-established ways of doing things which call for little if any change or improvement. By adhering to them, business moves off without much hitch or delay. With the intelligent and progressive mechanic it is different. While much of shop work is routine, there are nevertheless such constant demands upon his ingenuity, to meet new emergencies or cheapen and hasten processes, that he cannot lag behind if he would. We have in mind several instances: In a large iron establishment not a hundred miles from Cleveland, the manufacture of a new specialty was introduced nearly two years ago. New machinery had been patented and set up, and a successful run was promised from the very start. But one obstacle opened the way for another to such an extent that, to overcome them, the ingenious Superintendent, himself a practical mechanic, has been nearly all the time up to the present devising improvements upon his original process; so that, while he has now about reached the point aimed at, it has only been at the expense of a vast amount of painstaking experimenting and a constant exercise of the most consummate ingenuity. We were shown recently a simple device for describing a circle without the aid of a center, and on asking the veteran mechanic who exhibited it how he came to hit upon the idea, he replied that he had been studying on it for 20 years, but had only of late brought it to perfection! The foreman of a certain foundry seems never content with clinging to the old ways if he sees defects in them that ought to be remedied. The consequence is that he is a terror to the routine workman—but he is right in a vast majority of cases, because his inventive faculty is constantly on the alert. The only matter of regret is that so many ingenious mechanics are compelled to see the fruits of their thought and experimenting appropriated and enjoyed by others less deserving.

THE BENEFITS (?) OF SPECULATION.

Our amiable contemporary, the *Age of Steel*, St. Louis, figures out in a very readable article, that "Speculation is not Wholly Bad." It finds as one of results of a boom in manufactured products that our imports in that line have fallen off and that home manufactures, railroads, etc., have been kept more busy than they would otherwise have been. It admits that excessive speculation is bad and always leads to an era of depression, but pleads that many of the best results of a period of crazy enterprise are permanent and therefore desirable. It would have, not too much speculation—just enough. We believe there are many adroit reasoners who would be prepared to maintain the position that gambling is not wholly bad. For instance: It helps to support the family of the "gay gambolier" from starvation; it gives employment to clerks, waiters, steerers, etc.; it furnishes some of the gas companies' best patrons, and it affords diversion to a large class of routine-driven business men. In these respects it is not wholly bad. But because it is not, it is scarcely to be expected that the *Age of Steel* would countenance it. Surely our St. Louis friend would not give a man the fever so as to keep the doctors busy, nor would it justify the introduction of smallpox into a city because one of the "permanent results" would be the erection of a much desired city hospital. Yet, if we consider the results, neither the fever nor the smallpox would be "wholly bad." The whole question turns upon whether the thing speculated in has a reality or exists only in the imagination of the speculators and their victims. It also depends upon whether corners—in wheat, lard, iron, tin or anything else—are in the long run conducive to the public good. The *Age's* position would almost look as if it pointed to an adherence to the ancient fallacy that "the end justifies the means." Perhaps our St. Louis friend has not gone back far enough for the cause of the falling off in im-

ports. It is barely possible that our Protective Policy, rather than the philanthropic efforts of the speculators, may have had something to do with it.

MUSCLE vs. MACHINERY.

A singular contest took place in a New Hazelton, O., coal bank the other day. It was the old question of muscle *versus* machinery, in a new form. A Harrison mining machine had been placed in the mine, and, as usual, a great deal of good-natured discussion was had as to its working. On the one hand, it was claimed that it could do the work of four men; on the other, that two men could outdo it. Finally came a challenge to a friendly combat from two sturdy sons of toil, John Applegate and Joseph Hogan, the two men to put their work alongside that of the machine for three hours, the winning party to capture a purse of $100. Great interest was manifested in the match, hundreds of people gathering to await the result. For three hours—with the exception of 8½ minutes lost by the machine-man in changing from one room to another and in replacing picks—the underground contest raged. At the end of that time the judges found by measurement that the machine had dug 154 square feet and the two men 147 square feet, giving the victory to the machine, but by a close margin which was certainly most creditable to the men. The pick men gave 40 strokes to the minute, the machine 150. An average day's work for the pick is a 12-foot room three feet deep, or 36 square feet; of the machine, three 18-foot rooms, 4½ feet deep, or 243 square feet, but it is evident from the contest that the machine can make in one day of nine hours 462 square feet. We are glad to see that miners are growing to appreciate the advantages of machines and welcoming them as friends rather than viewing them as enemies.

And now the coke industry has been gobbled. Wm. K. Vanderbilt and a syndicate of Pittsburgh and New York capitalists have obtained a controlling interest in the coke ovens of the Connellsville region and propose to run prices to suit themselves. This is a pole that is expected to knock the financial persimmons in both directions—casting the bulk of the coke shipments, amounting to 700 cars a day, into the hands of the Vanderbilt railroads and exchanging ruinous competition into solid dividends for the Pittsburgh end of the syndicate. This is a feature of the iron market that doesn't look remarkably encouraging—to coke consumers.

Very interesting and valuable tables are printed on another page from the Bulletin of the American Iron and Steel Association, showing the condition of the pig iron business at the end of the first half of 1883, in comparison with the corresponding period of 1882. By these figures it is demonstrated that the period of over-production is passed, and the conclusion seems inevitable that the latter part of the year will witness the revival in trade so much desired.

Cleveland will take especial pride in the fact that a Patent Office decision, just rendered, places beyond question the priority of Mr. Charles F. Brush's claim to the use of cast lead in connection with electrical storage batteries—a decision which enables him to control about all of the really practical systems of storage now upon the market. Mr. Brush has been singularly and deservedly successful so far in disposing of infringements upon his valuable inventions.

AN ENCOURAGING SHOWING.

THE TROUBLE IN THE PIG IRON TRADE CORRECTED AT LAST.

A Decrease in Production Assured for the Remainder of 1883.

From the Bulletin of the American Iron and Steel Association.

So extraordinary was the demand for pig iron in 1879 and 1880, and so steady was the demand for it in 1881 and 1882, that it has been found to be a very difficult matter to restrict its production to the wants of the country in the comparatively dull year 1883. Ignoring for the present our production of pig iron in any of these years, let us glance at the statistics of furnaces in blast at the close of 1878, 1879, 1880, 1881, and 1882—the first year named being the last of the panic years. The figures are as follows:

1878.	1879.	1880.	1881.	1882.
265	388	446	455	417

These figures show that we commenced in 1882 to reduce the number of furnaces in blast, but it must be remembered that we have largely in late years increased the average capacity of our furnaces, new furnaces being in the main superior to old ones, and repairs to old furnaces being in the line of greater productiveness; hence the reduction in 1882 in the number of furnaces in blast mainly showed that the poorer furnaces had been forced into idleness by the better ones; it did not show reduced production. This, on the contrary, has increased. The production of pig iron in 1878, 1879, 1880, 1881, and 1882 was as follows, in gross tons:

1878, ...	2,301,215	1881, ...	4,144,254
1879, ...	2,741,853	1882, ...	4,623,323
1880, ...	3,835,191		

It appears, therefore, that up to the close of 1882 our production of pig iron had constantly increased since 1878. With the reaction in railroad building which became manifest near the close of 1882, and with other reactionary influences at work which need not be particularized, wise men saw that we could not safely continue in this year to increase our pig iron production. Nevertheless it has been difficult to make all pig iron manufacturers see what a few saw clearly at the close of last year. During the first few months of the present year nearly all of the 417 furnaces that were blowing on the 1st of January were kept in blast. As summer approached, and the price of pig iron declined, more furnaces here and there were blown out. Our statistics show that on the 1st of June only 351 furnaces were in blast—a decrease of 66 since the 1st of January. We can now add, as the result of inquiries which we have just completed, that during the month of June 17 additional furnaces were blown out, making 83 in all since the 1st of January, giving us 334 furnaces in blast on the 1st of July against 417 on the 1st of January.

This is of itself a most satisfactory showing, and as augury of good for the future of our pig iron market. But we are also able to accompany it with reliable statistics of the production of pig iron in the first six months of the present year—statistics which we have obtained directly from the manufacturers. It appears from the figures that are given in detail on this page that our production of pig iron in these six months was 2,352,019 gross tons, or only 40,357 tons more than one-half of the production of the whole year 1882, which was 4,623,323 gross tons. When we consider that the production of the first six months of the present year was accomplished with many furnaces running which are now idle, it will be seen at a glance that the production of the second six months must be considerably less, and that the production of the whole year must be less than that of 1882. This is as it should be.

That the policy of blowing out furnaces was a correct one, and that the furnaces now out should be kept out until there are substantial indications of an increased demand for pig iron, is proved by the statistics of stocks of pig iron in the hands of makers and unsold at the close of the first six months of this year, which will also be found in detail on this page. On the 30th of June these stocks amounted to 528,590 gross tons, an increase of 144,935 tons upon the stocks of 383,655 gross tons of unsold pig iron on hand on the 1st of January last. It is doubtless true that there has been some reduction in these stocks during July.

We have made diligent inquiry concerning stocks of pig iron in the hands of speculators in all the leading iron centres, and find that, with the exception of the Marshall iron at Pittsburgh, there is very little iron so held. The quantity of foreign pig iron in bond at all ports on the 1st of July was less than 5,000 tons.

Production of all kinds of Pig Iron.

States.	In blast Jan. 1st	In blast June 1st.	Furnaces July 1st. In.	Out.	Tot'l	Tons of 2,240 lbs. One-half of 1882.	First six mos. 1883
Maine, ...	1	1	1	. . .	1	1,831	1,923
Vermont, . . .	. . .	. . .	. . .	1	1	540	. . . . .
Massachus'ts	2	2	2	3	5	4,614	3,722
Connecticut,	7	3	5	4	9	10,867	11,961
New York, .	37	32	27	30	57	185,784	173,402
New Jersey,	13	10	9	10	19	78,931	71,611
Pennsylv'nia	185	163	151	124	275	1,093,418	1,211,811
Maryland, . .	11	10	11	12	23	24,341	18,537
Virginia, . . .	15	16	16	25	41	39,165	52,730
N. Carolina,	. . .	. . .	. . .	5	5	514	. . . . .
Georgia, ...	4	3	3	3	6	18,947	20,879
Alabama, . .	12	13	14	4	18	50,341	60,250
Texas, ...	1	1	1	. . .	1	589	2,000
W. Virginia,	5	3	3	8	11	32,688	36,213
Kentucky, . .	9	6	6	12	18	29,697	25,569
Tennessee, . .	14	11	8	11	19	61,429	64,872
Ohio, ...	62	41	44	49	93	312,009	319,238
Indiana, . . .	2	1	. . .	3	3	4,464	4,850
Illinois, ...	9	7	7	9	16	160,896	108,832
Michigan, . .	14	11	12	17	29	93,837	72,518
Wisconsin, . .	8	6	5	10	15	38,330	26,041
Missouri, . . .	3	6	5	12	17	50,734	41,200
Minnesota, . .	1	1	. . .	1	1	3,628	3,035
Utah, ...	. . .	. . .	. . .	1	1	26	. . . . .
Colorado, . . .	1	1	1	. . .	1	10,588	11,325
Oregon, ...	1	1	1	. . .	1	3,013	5,800
California, . .	. . .	1	1	. . .	1	441	900
Wash'n Ty, .	. . .	1	1	. . .	1	. . . . .	2,800
Total, ...	417	351	334	354	688	2,311,662	2,352,019

CHARCOAL.

States.	In blast Jan. 1st.	In blast June 1st.	Furnaces July 1st. In	Out.	Tot'l	Tons of 2,240 lbs. One-half of 1882.	First six mos. 1883.
Maine, ...	1	1	1	. . .	1	1,831	1,923
Vermont, . .	. . .	. . .	. . .	1	1	540	. . . . .
Massachus'ts	2	2	2	2	4	4,614	3,722
Connecticut,	7	3	5	4	9	10,867	11,961
New York, .	6	6	6	10	16	13,713	12,887
Pennsylv'nia	25	19	16	21	37	22,310	16,310
Maryland, . .	7	6	7	9	16	12,623	6,486
Virginia, . . .	12	11	8	21	29	11,666	4,800
N. Carolina, .	. . .	. . .	. . .	5	5	514	. . . . .
Georgia, . . .	3	2	2	3	5	6,949	6,379
Alabama, . . .	8	8	8	2	10	24,795	27,665
Texas, ...	1	1	1	. . .	1	589	2,000
W. Virginia,	. . .	. . .	. . .	5	5	. . . . .	. . . . .
Kentucky, . .	6	4	4	11	15	7,663	6,074
Tennessee, . .	7	6	4	8	12	16,790	13,425
Ohio, ...	19	13	13	14	27	26,185	16,030
Indiana, . . .	. . .	. . .	. . .	1	1	. . . . .	. . . . .
Michigan, . . .	14	11	12	15	27	93,837	72,518
Wisconsin, . .	7	5	4	8	12	24,718	18,678
Missouri, . . .	2	3	2	7	9	24,253	17,326
Minnesota, . .	1	1	. . .	1	1	3,628	3,035
Utah, ...	. . .	. . .	. . .	1	1	26	. . . . .
Oregon, ...	1	1	1	. . .	1	3,013	5,800
California, . .	. . .	1	1	. . .	1	441	900
Wash'n T'y, .	. . .	1	1	. . .	1	. . . . .	2,800
Total, ...	129	105	98	149	247	311,565	250,719

BITUMINOUS COAL AND COKE.

States.	In blast Jan 1st.	In blast June 1st.	Furnaces July 1st. In.	Out.	Tot'l	Tons of 2,240 lbs. One-half of 1882.	First six mos. 1883.
Pennsylv'nia	47	46	43	40	83	422,159	531,733
Maryland, . .	. . .	1	1	1	2	. . . . .	1,075
Virginia, . . .	3	5	8	4	12	27,499	47,930
Georgia, ...	1	1	1	. . .	1	11,998	14,500
Alabama, . . .	4	5	6	2	8	25,546	32,585
W. Virginia,	5	3	3	3	6	32,688	36,213
Kentucky, . .	3	2	2	1	3	22,034	19,495
Tennessee, . .	7	5	4	3	7	44,639	51,447
Ohio, ...	43	28	31	35	66	285,824	303,208
Indiana, . . .	2	1	. . .	2	2	4,464	4,850
Illinois, ...	9	7	7	9	16	160,896	108,832
Michigan, . .	. . .	. . .	. . .	2	2	. . . . .	. . . . .
Wisconsin, .	1	1	1	2	3	13,612	7,363
Missouri, . . .	1	3	3	5	8	26,481	23,874
Colorado, . . .	1	1	1	. . .	1	10,588	11,325
Total, ...	127	109	111	109	220	1,088,428	1,194,430

[Continued on Page 12.]

Practical Mechanics.

A New Form of Balance Dynamometer.

BY S. S. WEBBER, LAWRENCE, MASS.*

The Balance Dynamometer to be described was originally invented by Mr. Samuel Batchelder, then agent of the York Manufacturing Co., at Saco, Maine, is 1836. The principle of the instrument is, that to hold a weight by the radius of a circle, in a horizontal position, at a constant distance from its center, takes as much power as to lift the same weight through the distance which would be traversed by it in any given number of revolutions around said center or axis, and in the time required for such number of revolutions. Thus, in the present instance, the scale-beam or steel-yard is the radius of a circle, of which the circumference is ten feet, and the pin on which the weight is suspended would therefore traverse a distance of 1,000 feet in one hundred revolutions.

Now, one lifted 1,000 feet is equal to 1,000 pounds lifted one foot, and the weights used on the dynamometer are numbered accordingly. Following out the operation of the machine, we will suppose that twelve pounds are held up on the scale-beam, and that the counter shows a speed of one hundred revolutions in six seconds, a worm and gear being arranged so as to ring a gong-bell at every one hundred revolutions of the shafts. The twelve pounds, which are called 12,000 pounds, are then divided by the number of seconds consumed in the one hundred revolutions, and the result is $\frac{12000}{6}$=2,000 pounds lifted one foot in a second, which result being divided again by 550, the equivalent expression for a horse power in feet per second, gives 3.636 H. as the load passing through the machine.

The operation of the dynamometer is this: on the receiving shaft, in the present arrangement, are fixed a pair of fast and loose pulleys at one end, and a spur gear at the other. This spur gear drives a corresponding gear of the same size and number of teeth, which is fixed on the end of a sleeve or collar, having on its other end a bevel gear, which forms one side of what is known as a "box" or "compound" gear. A corresponding gear on the opposite side if the "box" is fixed on the delivering shaft, which passes through the fulcrum of the scale-beam. The two remaining sides of the "box" are composed of a pair of equal and similar gears, which revolve freely around the scale-beam on either side of the fulcrum. One would really be sufficient for the purpose, but a pair is used in order to preserve a balance.

When motion is given to the shafts by means of a belt to the receiving pulley, the intermediate gears revolve about the scale-beam without effect; but when a belt is carried from the delivering pulley to the machine to be tested, the resistance causes the intermediates to act with the effect of levers on the scale-beam, and would put the latter in revolution about its axis or fulcrum, if it were not restrained by the weights, which are to be added and apjusted until a balance has been obtained.

It will be readily seen that the real motion of the scale-beam, were it free to move, would only be one-half that of the shafts, and the weights in actual use are therefore double their apparent value, or in other words, the weight marked 1,000 pounds is in reality two pounds instead of one. In the original machine as invented by Mr. Batchelder, only one shaft was used, on which a pair of pulleys was put on one end, and another pair on the sleeves at the other, carrying the bevel. But this arrangement required a change either in the position of the machine to be weighed, or its driving pulleys, for every test, and a second shaft was added by Mr. Jas. B. Francis, of Lowell, in order to bring the receiving and delivering pulleys into the same driving plane, and a further addition was made by him, at the suggestion of the late Uriah E. Boyden, of the dash-pot, or hydraulic regulator. This is a cylinder filled with water or oil, in wnich a piston traversed with moderate freedom, and which is attached to the other end of the scale-beam in order to check vibrations and insure steadiness.

In the first machine built for Mr. Francis, and in several others either copied directly from it or slightly varied, the two shafts were upon the same horizontal plane, and increased the length of the floor space required, so that in many cases it was difficult to place the dynamometer in the ordinary alleys or floor space left between the machines in the cotton or woolen mills or machine shops. This difficulty is obviated in the form of construction adopted in the drawings by placing the shafts vertically, one above the other, and space is also economized farther, by making the frame of iron, instead of wood.

The diameter of the dish-pot or hydraulic regulator is increased so as to obtain a more perfect resistance to vibratory or irregular motion, while the piston has sufficient clearance to move freely through the oil, which is used as a resistiug fluid at a slow velocity. The level gears are of cast-steel. The central top or fulcrum of the scale-beam, around which the intermediate gears revolve, and through which the shaft passes, is of phosphor-bronze, to ensure the necessary strength with the least friction.

A pair of pulleys is provided for each shaft, the inner one of each pair being keyed fast to the shaft, while the outer ones are fitted with set screws, having proper seats sunk in the shafts, so that they can be locked, so as to make one wide driving pulley, or by releasing the set screw, they can be made into a pair of fast and loose pulleys, for the receiving shaft, aecording to the direction from which the belt is delivired, whether from above or below.

The gear teeth have been made of ample strength to resist the pressure of all the weights furnished with the instrument, if the whole strain were applied to one tooth, and as they are so cut that three teeth will always be in contact at the same time, the factor of safety is amply sufficient, and the power which can be be weighed, by the use of all the weights, is equal to one horse-power for every hundred revolutions of the shafts, or to all the power which can be relied upon to be transmitted with safety by a single belt of 2½, or even 3 inches wide, although the pulleys are intended in the machine which we have built for a belt of 2½ inches.

The scale beams are made detachable for convenience in packing and transportation, and a "gnide-wire," or "sight-rod," is added, fitting into a socket of the frame, and standing, when level, parallel with the steel yard, by which the operator can easily see when he has attained his balance.

The floor space occupied by this instrument is 30x24 inches, and its weight, for the machine alone is 284 pounds, the weights for use, which accompany it, being seventy pounds in addition. It will thus be seen that the Dynamometer as constructed gives the minimum of weight and space occupied for its capacity, and is easily adjusted in position and requires no change to be made in the position of the pulleys on the machine or shaft to be tested. All that is necessary is to locate the Dynamometer in position to belt from the line shaft and on to the machine which is to be tested, to fasten the legs with four lag screws to the floor and to attach the belts—all of which is done in a short time. In every case the running balance of the Dynamometer when belted should be weighed before throwing off the belts after the completion of any test, and this balance weight deducted from the gross gives the net power consumed in the machine so tested. There has been exception taken by some engineers and others to the results obtained by Dynamometers, and in many instances there was good reason for so doing. Any form of Dynamometer depending on springs, actuated by centrifugal forces or otherwise, must in time become inaccurate, if not so when first constructed. The form described is to be the true one; and since it embodies the principle of a known weight actually lifted through a known space, it must be very accurate. As proof of this, it may be said that such a machine has been used for the past ten years, weighing over one hundred thousand H. P., in small amounts, and the totals in some cases aggregating 250 H. P. have agreed within a few per cent. with the results obtained from indicator-cords taken from the engine driving the same machinery. In addition, numerous comparative tests, made with the Prony brake, all showed that the error, if any, was extremely small between the two, provided, of course, that the test were accurately made and with proper apparatus for a Prony brake. In these days, when economy of power is becoming such a study, a reliable instrument, easily applied, will be found an invaluable aid to engineers, and others with whom the supplying or use of power is a source of profit.

* Prepared for the Cleveland Meeting of the American Society of Mechanical Engineers, but not read.

Concerning Steel-Casting.

BY GEORGE COWING, OF CLEVELAND.*

The molds used in the manufacture of steel castings at the present time are three in number, viz.: The Repee, the coke and the Cowing silica molds. The Repee molds are extensively used in England and on the continent, and are composed of old clay crucibles pulverized and about twenty per cent. of plumbago. The molds are made the same as in the ordinary foundry practice and placed in an oven and thoroughly dried. After being taken from the oven, and while hot, they are coated with coal-tar, and are then ready to be filled with molten steel. The coke molds are composed of pulverized coke with a binder of fire clay, sour beer, etc., made into molds the usual way and thoroughly dried. The Cowing silica molds are composed of quartz rock pulverized to an impalpable powder, moistened with glue-water for a binder, formed into molds as in the regular foundry practice, and thoroughly dried. After being filled with molten steel and binder of glue dissolves, and the molds disintegrate, which allows for the shrinkage of the steel. Steel castings of complex form can be made without danger of pulling apart or being strained, and as smooth as a first-class cast-iron casting.

It is a fact well-known among the various steel works of this country that it is impossible to produce a steel casting that is soft and ductile in any mold that contains black lead, pulverized coke, coal or any of the various forms of carbon, for the reason that the molten steel, as soon as poured into the molds, having an affinity for carbon, absorbs the carbon of the mold to such an extent as to change its entire physical qualities. Part of the carbon so absorbed from the mold chemically combines with the steel, increasing its hardness, and part is mixed with the steel and permeates in in a graphite form, producing a brittleness or softness in the casting, similar to cold-shortness produced by phosphorus. Steel castings so produced are not suitable for structural or ship-building purposes owing to their want of ductility, and besides are liable to become honeycombed or full of pin-holes in consequence of the reaction that takes place within the molds after being filled with molten steel. The Repee molds, when dried, are as hard as a stone, and as unyielding, and will not disintegrate to allow for the shrinkage of the steel in cooling, and, although a great deal of care and skill are required in so constructing them that the casting may not pull apart in cooling, (as the shrinkage of the steel is double that of cast-iron), yet there are many kinks of complex steel castings that in practice cannot be made in Repee or carbon molds, owing to their hardness in not yielding to allow for the shrinkage of the steel. Many castings that are made in said molds are strained nearly to their breaking limits, which also renders them unfit for either structural or ship-building purposes. Since the introduction of the Cowing silica molds for making steel castings, it has been demonstrated that all the various forms heretofore forged for structural and ship-building purposes and marine and other engines can be cast in soft ductile steel, perfectly solid and homogeneous, having double the tensile strength of wrought-iron and at less cost. Steamship shafts, large ordnance and the like, that heretofore required several men to forge them, and a heating and steam-hammer plant that would cost not less than a quarter of a million dollars, can now be produced at many of the various steel-works in this country in a few days' time, out of steel that is superior to the best forging in ductility and tensile strength. The few years that the Cowing silica molds have been in use, the rolling mills and steel works through-

* Chicago Industrial World.

out the country have acknowledged their merits by numerous testimonials and by equipping their blooming and rolling mills with steel rolls, gearing, and castings liable to break; and many of them have been enabled to declare handsome dividends to their stockholders, whereas under the old regime of cast-iron, said dividends would probably have been consumed in repairs.

Heating and Hardening of Steel.

To understand how to properly harden and temper steel tools and other articles is fully as necessary to the machinist now, when most small tools are kept in stock by dealers, as it was twenty years ago, when each shop made its own tools. Lathe and planer cutters, cold chisels, milling cutters, and several other tools and appliances are liable to breakage, and must be redressed at the anvil, refinished, and rehardened and tempered. But many of these tools are ruined in the attempt, and this destruction usally comes in the hardening.

Some mechanics attach much importance to a hardening pickle, but probably failure comes as often by injury in heating the article as by hardening and tempering. An evenly distributed heat of the proper temperature is absolutely requisite to success, and this it is not always possible to assure by heating in an open fire. One portion of the article is liable to be overheated, while another portion is underheated. Judging of the amount of heat by color is not always to be trusted; a dark corner or a cloudy day changes the conditions from a light shop and a sunny day sufficiently to make a great and telling difference in the amount of heat judged by sight.

A perfectly reliable method of heating for hardening is by means of the lead bath. It is an easy matter to keep in the shop a crucible or iron pot of lead to be used as occasion demands. The article to be heated for hardening will not suffer when in the lead bath, even if not closely watched, as is necessary at the open fire; the melted lead cannot pass to a degree of heat injurious to the steel. But one condition must be strictly observed—the lead must be pure and clean; it is best to buy the mercantile pig for this purpose. A manufacturer of pipe threading and pipe cutting tools in a New England city, desiring to abandon his old-time open fire method for the lead bath, melted a lot of old lead pipe partially corroded, and mixed with it a quantity of type metal. His hardening was a failure until he used pure lead.

In order to harden well it is necessary to heat the article through and through. If the piece is of unusual thickness, as a tap or reamer of three inches or more in diameter, it is better to drill a hole through it from end to end, so that the heating can be even and hardening be equal. A tap of four inches diameter broke squarely across in the hardening. It was of solid steel. The drilling of an inch hole from end to end was practiced, and a large number of the same size taps were hardened without a failure. The surfaces of the fracture of the broken tap showed plainly the evidences of unequal heating and uneven cooling.—[Scientific American.

New Engine for Electric-lighting.

Mr. E. D. Farcot has designed a new form of compound engine for electric-lighting machinery. It consists af two cylinders, the larger set above the smaller. The space between the two pistons is undivided, and is in communication with the interior of the engine frame, and is never put in connection with the steam-supply pipe. The steam first enters the small cylinder, and is thence exhausted into the large cylinder, thus giving the pistons, which are both on a single rod, in opposite directions by a system of intermitted expansion. The engine is thus seen to be of the 'Wolff system.' The space between the two pistons is made to communicate with the larger space in the frame, merely to secure a reduced variation of uncounterbal anced pressure. No stuffing-box is needed in this engine in any inaccessible part of the machine. The valve-gear is of the plainest possible description, and the whole engine is built with a view to simplicity and small cost in construction and operation. It is intended to be driven up to four hundred revolutions per minute.—[Publication Industrielle.

A New Portable Steam Drill Press.

The portable steam drill press herewith illustrated, is claimed to supply a need to manufacturers, builders and workers in heavy iron castings, that no other machine does. As will be seen, it is intended to take the place and do the work of the hand ratchet. It is claimed to save much time and obviate the necessity of handling heavy pieces. Trusses, girders and

other work may be placed in position and drilled with ease and despatch, without the possibility of error or misfit. Its weight being but 65 lbs. it can easily be transported from place to place and can be operated by an ordinary mechanic. The driving power is a miniature of the Noteman engine, built and sold by the Noteman Rotary Engine and Pump Co., Toledo, for the past three years. Further particulars can be obtained of them.

A Well-Known Cincinnati Concern.

The Cincinnati Steam Heating Co., 187 West Pearl Street, report business good and will have a heavy fall trade. The company are manufacturers, dealers and contractors for all kinds of steam and hot water heating apparatus, boilers, radiators, pipe, fittings, bronze goods, etc. A specialty is made of low pressure steam and hot water heating apparatus for public and private buildings, the Eureka Steam Generator owned and constructed by this company being, it is claimed the most complete device of the kind in use. It combines durability, economy, efficiency and safety in a remarkable degree and has never failed to give entire satisfaction in all the hundreds of cases where it has been put up in buildings throughout the country. This house is the only one in the city that makes a specialty of steam heating apparatus, and all of its devices are constructed in strict accordance with scientific principles, which accounts for the great satisfaction they give in actual use. A large force of skilled men are constantly employed, together with their special machinery, affording every facility for doing strictly first-class work. Their business from a small beginning has grown upon the merit of the work to an extensive and profitable one, every device put up advertising the superiority of the system and thoroughness of the construction. Parties contemplating warming their houses, factories, &c., with steam or hot water should send to this company for circulars and prices.

THE Marine and Mechanical Engineering and Metal Trades Exhibition, held in London Eng., during the first three weeks of July, was one of the remarkable specialty expositions of the year. The exhibitors, numbering about five hundred, included many of the great engineering firms of Great Britain. Casting, forging, tramway, bridge, and girder work, and the various tools used in the manufacturing processes, were among the exhibits. In a statement of the importance of these industries it was noted that the iron and steel exports of Great Britain last year amounted in value to $215,000,000; besides the vast home demand for railing and other interests and for machinery.

Recent Ohio Patents.

LETTERS-PATENT have been issued to the following Clevelanders the past week: Benjamin K. Emerson, horse collar; Charles Gordon, improved cuspidore; Joshua Thomas, oil still. A design for a paper weight was issued to John A. Prindle, and a design for printing type to Henry H. Thorpe, assignor to the H. H. Thorpe Manufacturing Co.

AN improvement in springs for side bar vehicles has recently been patented by Mr. Jocob Hanser, of Oxford. Two or more flat leaf springs are connected to spring bars; levers are also pivoted to the said bars, which also connect with the side bars of the vehicle. By the arrangment of springs, levers, and bars, vehicle is rendered very easy to the rider.

A VERY simple car coupling has been patented by Mr. O. P. Musgrove, of Steubenville. The drawhead of the car is provided with two hooked members, between which is pivoted a tumbling lever having an arm at right angles to it, which arm projects upwardly. The drawhead is further provided with a connecting clevis which, when the cars are to be coupled, is inclined against the projecting arm of the tumbler lever, so as to be thrown forward over the hooks of the other drawhead when the cars come together.

MR. William Lane, Cleveland, has invented an attachment by means of which the danger of accident by reason of cars jumping the track is claimed to be overcome. The device consists of a brake, fixed between the floor of a car and the trucks, so that at any position of the trucks, whether on a curve or straight track, by the application of a lever at the end of the car, the wheels may be held securely. By this means, all danger of jumping the track is lost, as the trucks will meet the track squarely upon passing any obstruction.

MR. John J. Callow, of Cleveland, has added another imrpovement to his previously patented process of wood graining by the use of stencil plates. The last patent is dated July 8, 1883. The several parts of the figure or pattern are made of thin sheet material, such as sheet brass of tin. These parts are made in separate pieces cut out with shears; and what is cut away from one pattern may serve as a pattern in another plate. Thus every part of the material may be used. The several parts are then joined firmly together by wires and by suitable braces, the whole forming a stencil which is admirably adapted for graining wood.

A Costly Mistake.

Some time ago Mr. W. D. McAdoo, proprietor of the McAdoo House, in Greenboro, wanted a plate of glass, in size 22x32 inches, and wrote to a New York house to send it to him, and draw on him at sight for the pay. Now, it might have been all right, but Mr. McAdoo wrote "feet" instead of "inches." The New York firm, on receiving this extraordinary order—the glass wanted being described as fine French plate—concluded that there must be some mistake, and telegraphed to Mr. McAdoo in substance about as follows: "Haven't you made a mistake? In all our thirty years' experience we have never received an order of this sort." Mr. McAdoo, confident that he was correct, telegraphed that he "wanted what he ordered," and for them to send it along. The firm, not yet satisfied, wrote him a letter stating that they would not be able to fill the order unless they were to import the glass, and to this Mr. McAdoo replied: "Go ahead and import." In the course of time Mr. McAdoo was astonished at receiving a bill of lading for a piece of French plate glass, one inch thick, thirty-two feet long and twenty-two feet wide, shipped on steamer from France to Norfolk. The immense piece of glass, carefully boxed, was carried across the ocean on the steamer's deck, and was was laid on the wharf at Norfolk, where it now remains. There is no possible way of transporting it over land by rail, as it would not pass through the cuts along the railroad, nor could it go through the covered bridges. No doubt if Mr. McAdoo could get it to Greensboro he would find some use for it, but how to get it there is the question. It cost him $3,100.

Market Review.

OFFICE OF TRADE REVIEW AND WESTERN MACHINIST.
CLEVELAND, FRIDAY EVENING, August 3, 1883.

IRON ORE.

Several moderate sized lots have been placed the past week, aggregating probably 25,000 tons. Both producers and buyers seem reasonably well satisfied with the market. Orders for future delivery are still coming in. The receipts for the past week have been 44,455 tons, against 34,387 tons last week. Shipments have aggregated 18,448 tons, against 20,022 tons last week. Receipts at Cleveland during July aggregated 124,943 tons, against 93,151 tons in June. Mining companies have been hastening forward shipments to lake ports in order to avail themselves of the cheaper lake freights, but this does not alter the fact that the aggregate production is being very materially decreased from last year. What effect the sudden stoppage of the Republic mines, on account of a strike of its 400 miners, will have remains to be seen. Lake freights are gradually stiffening, the rate from Escanaba having gone up to $1.05a$1.10; while a charter is reported to have been made from Marquette at $1.20. The Marquette Mining Journal says: "Compared with the ore shipments for the corresponding period in 1882, the total shipments by lake from this district up to date of Wednesday, the 25th inst., this year show a decrease of 503,609 gross tons; and carrying the comparison back another year we find the shipments for the corresponding part of the season of 1881 also showing an excess over the amount forwarded thus far this year. At this date in 1881, 913,363 gross tons of ore had been sent to market from the lake ports of the district, against 878,578 tons the present season. Verily we are falling behind, but if the furnacemen can stand the shrinkage it's certain we'll have to." We quote for the local ore market:

No. 1 Specular and magnetic Bessemer Ores per ton	$7.50@ 8.00
No. 1 Specular (non-Bessemer) ores per ton	6.50@ 7.00
Bessemer Hematites	5.00@ 5.25
Non-Bessemer Hematites	4.25@ 4.75
Menominee Range Bessemer	6.25@ 6.75
Menominee Range non-Bessemer	4.50@ 5.00

IRON.

PIG IRON.—There has been a little improvement in the market the past week. Mill irons are moving off more rapidly than foundry, but trade in general is quiet. There seems to be a general acquiescence in the idea that prices have reached bottom, but there seems to be no particular anxiety either to buy or sell at present. Important facts bearing on the pig iron are to be found on another page. The outlook is certainly better than many supposed. The period of over-production has been passed, and the turn for the better has been made. We quote, with some changes from last week:

CHARCOAL PIG IRON.

No. 1 Lake Superior charcoal	$24.00@25.00
No. 2 Lake Superior charcoal	24.00@25.00
Nos. 3 and 4 Lake Superior	25.00@27.00
Nos. 5 and 6 Lake Superior	24.00@26.00
Nos. 1, 2, 3, 4, 5, Salisbury	35.00@37.00
Southern Car Wheel	28.00@33.00

BITUMINOUS AND COKE IRON.

No. 1 foundry, all lake ores	$21.50@22.50
No. 2 same	20.00@21.00
No. 1 foundry, lake ores, with cinder mixture	20.50@21.50
No. 2 same	19.50@20.50
No. 1 foundry, native Ohio ores	21.00@22.00
No. 2 same	19.00@20.50
No. 1 silvery, native Ohio ores	21.00@22.00
No. 2 same	18.00@20.00
No. 1 gray forge, red short	19.00@20.00
No. 1 gray forge, neutral	18.50@19.00
No. 1 Bessemer	22.00@23.00

CINCINNATI.

[Reported for the TRADE REVIEW by E. L. Harper & Co.]

The sales of the past week aggregate a large amount of pig iron, and inquiries are very numerous. Number one foundry irons of reputable brands are in active demand and the supply is short. Reliable softeners are comparatively the highest priced irons in the list, the requests being far beyond production. Mill irons have been somewhat sluggish the past fortnight, but reliable neutral brands are sought for in round lots at current figures; but many of the furnaces decline to sell for forward delivery at figures prevailing. Strong Southern Coke Foundry Irons No. 2 are moving liberally. Cold Blasts are the only neglected irons in the list. The following quotations represent the general transaction prices at this date. We quote (4 months):

Foundry—Hanging Rock Charcoal, No. 1, $23 75@$24 75; Hanging Rock Charcoal, No. 2, $22 75@$23 25; Strong Neutral Coke, No. 1, $19 50@$20 50; Strong Neutral Coke, No. 2, $18 00@$19 00; American Scotch, No. 1, $18 50@$19 00. Grey Forge—Neutral Coke, $17 00@$17 50; Cold Short, $16 50@$17 00. Car Wheel and Malleable—Hanging Rock Strictly Cold Blast, $28 00@$28 75; Hanging Rock Warm Blast, $24 00@$24 50; Lake Superior, 1 and 2, $25 50@$26 00; Lake Superior, 3 to 6, $26 00@$27 00; Southern Car Wheel Strictly Cold Blast, $28 00@$29 00.

[Reported for the TRADE REVIEW by Rogers, Brown & Co.]

There has been considerable buying the past week, mostly for prompt or early delivery. But every attempt to impart any real stiffness to prices, based upon this activity fails. Competition in finished iron and castings has driven prices so low that buyers say they must have very cheap pig iron or stop. Besides, the new furnaces of large productive capacity have created a general impression that pig metal will always be plenty, and that no scarcity can again occur which will send prices rapidly upward. The July furnace statistics showing that the year's production will fall of that of 1882 have reassured those who fear over-production. Whether consumption is declining in like proportion, opinions differ, and there are no authoritative figures to decide. There are no changes in the relative demand for different grades and kinds as stated last week. We quote for cash:

Hot Blast Foundry.—Hanging Rock Charcoal, No. 1, $23 50@$24 50; Hanging Rock Charcoal, No. 2, $22 00@$23 50; Southern Charcoal, No. 1, $22 00@$23 50; Strong Coke, No. 1, $20 00@$21 00; Strong Coke, No. 2, $18 50@$19 50; Strong Coke, No. 3, $18 00@$18 50; Soft Stone Coal, No. 1, $20 00@$20 50; Soft Stone Coal, No. 2, $18 00@$19 00. Forge—Strong Neutral No. 1 mill, $17 00@$17 50; Cold short No mill, $16 00@$17 00. Car Wheel & Malleable—Hanging Rock Cold Blast, $31 00@$33 00; Hanging Rock Warm Blast, $25 00@$27 00; Southern Car Wheel Iron, $26 50@$27 50; Lake Superior Car Wheel Iron, $25 00@$26 00: Lake Superior Malleable Iron, $25 00@$26 00.

CHICAGO.

[Reported for the TRADE REVIEW by A. B. Meeker & Co.]

The market for Lake Superior Charcoal is firm, and there is a generally fair demand for all kinds of pig iron. We quote today (July 31):

Lake Superior Charcoal, 1 & 2, $24 00@$25 00; Lake Superior for Car Wheels, No. 3, $24 00@$25 00; Lake Superior for Car Wheels, 4 and 5, $25 00@$26 00; Scotch, according to brand, No. —, $26 00@$27 00; Hanging Rock, Charcoal, No. —, $24 00@$26 00; Hanging Rock Coke, No. —, $23 00@$25 00; Anthracite, No. —, $23 00@$25 00; Anthracite, No. 2, $22 00@$24 00; American Scotch, No. —, $23 00@$26 00.

MANUFACTURED IRON.—There are no new features to note this week. Stocks at the mills are not large as compared with some weeks back.

SCRAP.—The market, which has been decidedly flat, is looking up a little. A few orders have been coming in for old rails, which bring $21 in Cleveland. There is no inquiry for old steel rails,

METALS.

Quotations remain unchanged, but there is a very good trade in copper, tin and lead.

MACHINERY OILS.

Business is very quiet with no tendency to higher prices at present.

HARDWARE.

Trade is quiet, as usual at this time of the year. Stocks of hardware are generally light in the hands of retail dealers. Trade is quiet in saws but good in files. Sales have been as good the present Summer as expected, and the prospects for a brisk Fall's business are good. The American Machine Co., of Philadelphia, Pa., have issued a circular regarding the prices of fluting machines, to the effect that 35 per cent. discount from list is the best price to the retail trade. "Original Knox" fluting machines are subject to a special allowance of 25 cents as heretofore. The Penfield Block Co. Lockport, N. Y., have reduced the price of their pulley block and store and warehouse trucks from discount 35 per cent. to discount 40 per cent.

NAILS.—Nails remain at $3.00, with very light stocks in the hands of both merchants and mills. The demand is good.

LUMBER.

The volume of trade is good, and the prospects for the Fall trade are excellent. The local trade is largely increased over last year, with prices about the same. Lake freights have lately advanced, the rate now being $1.50 from Bay City. It is expected to go up to $2 or $2.50 before the season is over.

COAL.

A fair amount of business has been done the past week. No immediate changes in prices are anticipated. The rates on coal are, at present, 50 cents per ton to Milwaukee, and 65 cents and 70 cents to Chicago.

LUMBER MARKET.

PLANK—MIXED WIDTHS, 1¼ AND 1½ INCH.

A 1 & 2..$50 00 A 3..$40 00 B. $32 00 C..$21 00 D..$14 00 E..12 00

2-IN. 12, 14 AND 16 ft., TOGETHER.

A 1 & 2..$48 00 A 3..$40 00 B..$32 00 C..$21 00 D..$14 00 E..13 00

BOARDS—1 IN. MIXED WIDTHS.

A 1 & 2..$45 00 A 3..$36 00 B..$30 00 C..$20 00 D..$15 00 E..12 00

STOCK BOARDS—12 IN.

A 1 & 2..$45 00 A 3..$36 00 B..$35 00 C..$20 00 D..$15 00 E..12 00

STRIPS—6 IN.

A 1 & 2..$42 00 A 3..$ ... B..$35 00 C..$22 00 D..$17 00 E..12 00

FLOORING, SIDING AND CEILING.

Matched flooring.....A 3, $42 00 B, $38 00 C, $24 00 D, 20 00
Matched drop siding, 6 in. A 3, $42 00 B, $38 00 C, $24 00 D, 18 00
½ in. bevel siding.....A 1 & 2, $24 00 A 3, $20 00 B, 18 00
Beaded ceiling $2 higher than flooring.

BILLSTUFF.

Small joist, 12, 14 & 16 ft. $13 00 | Small timb'r, 12,14,16,18 ft 14 00
18 ft .....$13 00@$14 00 | larger than 8x8, special.
Long timber 20 ft. and over, add about $1 per ft. to the price of short.

SHINGLES, LATH AND MILL WORK.

Shingles, XXX, 18 in.....$4 25 | S, 1 S, $1.00; S, 2 S $1 50
clears or clear butts..
$2 50@$3 00 | Matching, flooring and
Lath .....$2 75 | drop siding.....$2 00@$2 50

IN Krupp's great gun manufactory, at Essen, compressed carbonic acid is used for the manufacture of what ice and seltzer water may be required by the workmen.

A Perfect Smoke Consumer.

Mr. E. L. Brown, of Chicago, at the annual meeting of the Western Gas Association gave an account of a smoke consumer he has tried with good success for ten years. He says, in opening his remarks on the subject: I will state, in the commencement, that I am in no way interested in this burner. I bought and paid for it, and have no further pecuniary interest in it. It has been in use since the Spring of 1872. Ordinarily, in passing by my place, you would think the works were not running, if you were to judge alone by the absence of smoke at the chimney. My boiler is 12x46; it rates at 40 horse power. I run an 80 horse power engine full up. I heat two stories of my factory, which is an old wooden building, 80x106. I furnish power for my iron business and for my sand blast. In addition to heating my own building I heat a drying-house, and furnish power to run a large furniture factory. I also run a foundry and a large polishing works. All this is done from the one boiler. I do it with two-thirds of a ton of common Illinois screenings per day, the year round. I calculate that I have saved $5,000 in ten years, by the use of that burner. It is the simplest thing imaginable. It is constructed upon the only correct principle. It is a tubular boiler. The heat comes back from the back of the boiler, passes out and goes up the chimney. Across the back end of the chimney is what we call the mud drum, running across the boiler, and is 16 to 18 inches in diameter. Across the front end of the boiler there is another drum of the same size, made of the best fire-box iron, ⅜ inch thick, the boiler being 5 16. That runs right across from the brick wall. They are both connected by a neck running up into the boiler in the usual way. It is about 2½ feet from the front end of the boiler. There are those two mud drums running across, one at the front end and the other at the back end. Those two are connected together at the front end by a 1-inch pipe. I had trouble with the pipe at first because I did not put in a slot joint to allow for contraction and expansion. The top of the front mud drum is bricked up with fire-brick solid from the bottom of the boiler, so that all the combustion has to go under the first drum. The fire-grate is placed at an angle of 45 deg. and runs down under the centre of the first drum, and from there it runs back 2½ feet on a straight line, level, where it meets the fire-wall, which turns the heat up against the boiler. This runs down 8 inches from this grate to this front drum. It is one of the most beautiful things you ever saw. We simply fill the front with coal right up to the drum. We shut the top doors, above the fire, and we open the others a little. In the front box the coal cokes. The gases are formed in there, and are drawn through the white hot fire. I have a place through my brick wall, over the level grate, where I can look in and see the fire; and there is a stream of gas which comes up just as if it were blown out of a blow pipe, and strikes directly behind this boiler. There is not a boiler in Chicago of twice the size which does more work than mine. It simply makes the gas and burns it; and the gas has to be drawn through the coal to be consumed. The men do not have to clean out the flues oftener than once a week.

A GERMAN has invented a safe that on its being tampered with, throws open its doors, seizes and drags and locks in the burglar, and handcuffs and holds him in readiness to be conducted to the police court in the morning. The Yankee is experimenting with a set of books for the use of county officers, which, as soon as a fraudulent entry is made in them, will, by means of a clever electrical contrivance, sound an alarm on the court-house bell.

IN the presence of 30,000 people, President Arthur, on Wednesday, started the machinery of the Louisville Exposition, which is to have a run of 100 days. The people of Louisville have spared no pains to make this a complete success, and the throngs of visitors that will take the pilgrimage to that beautiful city will no doubt confirm the wisdom of their efforts.

COMMUNICATIONS from practical men are always welcome, and will be promptly printed.

Cleveland Wholesale Prices.

[The lowest quotable prices are given in all cases.]

HARDWARE.

Adzes.

Carpenter's.....per doz $18 40
Ship..... " " 18 75
Heavy railroad.. " " 19 50

Axes.

per doz.
James' 2d qual..... $7 00
Buckeye..... 7 75
" doub. bitt..... 15 00
Hunt's..... 9 50
Mami's..... 8 00
Lippincott's Crown..... 8 50
Cut More..... 9 00
Peck's Double Bit..... 22 00
"Champion Blade..... 11 00
Good triple silver steel.. 11 50

Axles.

Standard list,....
Nos. 1 to 6, 50 & 10 off
Nos. 7 to 14, 50 & 5 off
Nos. 15 to 18, 45 off
Nos. 19 to 22, 50 & 5 off

Anvils.

per lb.
Eagle, Amer.....10c dis 20
Wright's.....11¼c@11c
Armitage's Mouse Hole.....9½c@9¾c
Trento.....10¾c
Wilkinson's.....10¼c

Anvil Vise and Drill.

Millers Falls Co. $28.....dis 20
Cheney Anvil and Vise dis25&2

Augurs and Bits.

C S cut augers.....dis 50&10
do do do bits.....50&10
D C gimlet do Ives..dis 50
Snells bits.....dis 40&10
Russell Jennings' augers, dis 10&10&10
Cook's pat augur.....40&10

Animal Pokes.

Akron.....$ 3 50
Camp's..... 4 00
Berea, per doz..... 4 00
Eagle, per doz..... 5 00

Apple Parers.

Domestic & Reading ℔ doz. $7 00
Turn Table..... 4 50

Bolts.

Machine..... dis 70
Plow..... dis 50
Plow, R. B. & W..... dis 40
Cast Iron Barrel Shutter, etc.....dis 55&10
Cast Iron Chain (Sargent' list).....dis 60&10
Ives' Pat. Door Bolts. dis 50
Wrought Barrel.....dis 55&10
Wrought Square.....dis 55&10
Wr'g't Shut'r, all iron, Stanley's list.....dis 50&10
Fire, R. B. & W., new list.....dis 70&10
Stove, American Screw Co.'s..... dis 40
B. B. & W.....dis 40
Bolt Ends 16c. per lb. net... 60

Bellows.

Dis
Bl'ksmith's com new list, 50 ℔ ct
Moulder's new list, dis 25 ℔ ct
Hand, new list, 25 per cent

Butts.

Dis
Wrought brass..... 70
Cast, loose joint.... 60&10
Pin, loose..... 55&10
Wrought, fast joint narrow..... 50&10
Wrought fast joint broad..... 50&10
Wrought loose joint broad..... 55&10
Wrought table and back flaps..... 50&10
Loose joint, without acorns..... 55&10
Ten per ct. extra dis for cash.

Boiler Plates.

"Gaylord"-Standard Quality.
C. No. 1..... 4 50
C. H. No. 1 Sheil..... 4 75
C. H. No. 1, 50,000..... 5 25
C. H. No. 1, 55,000..... 5 75
C. H. No. 1 Flange..... 6 50
Firebox.....
T. S., 60,000 .....(as per)..6 50
T. S., 65,000 .....(act of)..
Homo. Steel, 70,000 (of Cong) 7 50
Heads, ¼c ℔ lb. extra.
N.B.-Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch.... dis 25
"National" Special Locomotive Tubes.....net list

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Boiler Makers' Tools.

Doty's Power Shears..net list
" Hand Lever Shears.net list
" Power Punch.....net list
" Hand Punch.....net list
Steel Screw Punch.....net list
Iron Screw Punch ....net list
Boiler Plate Rolls.....net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander..dis 15
Roller Tube Expander.net list
National Tube Cleaner .dis 20
Wire Flue Brushes ....net list
Anvils—'Peter Wright' 12½ ℔ lb
Solid Box Vises net list

Cleveland Stamped Elbows

Genuine Russia Iron

4½inch, per doz..... 5 50
5 do do 7 50
6 do do 9 50
7 do do 11 00

Charcoal Iron

4½inch, per doz..... 2 50
5 do do 3 50
6 do do 4 25
7 do do 5 50
Planished Amer. Russia Iron
7½inch per doz..... 5 00
4 do do 6 50
5 do do 9 50
6 do do 8 05
Discount 33⅓ per cent

Chisels.

Hot and cold cutting...℔ lb 30
Railroad track 30
Machinists..... 30
Mallet head 50
Jape 50
Packing 50
Stone cutters 50

Crowbars.

Cast steel ..... ℔ lb 7
Iron, steel points..... 5c

Cutlery, Pocket and Table.

Meriden Cutlery Co., table net
Am. Miller Bros.' Cutlery Co ..... dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co. list net
Aaron Berkenshaw's pocket dis 25
Fram Cutlery Co., table net
Cleveland Cutlery Co...dis 25
Miller Bros., pocket.... 33⅓
Akron Cutlery Co.....dss 45

Coopers' Tools.

Bradley's ..... dis15@20
Braton's ..... dis15@20

Chains.

Coil by cask.....

3-16	¼	5-16	⅜	7-16	½
10¾	9	8	7	6¾	6¼

Drills and Drill Stocks.

Blacksmiths', each $2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W ...dis 20&10

Drawing Knives.

Peck, Stow & Wilcox... dis 70
Witherby's .....dis 65@10
Nobles Mfgr. Co 15
Adjustable handle 20

Emery and Sand Paper.

Regular Numbers .....℔ lb 6c
Flour and F. F.....℔ lb 4c
B. & A. Emery Paper ...dis 35
Sand paper .....dis 35

Enameled & Tinned Ware.

Kettles .....dis 50
Sauce Pans.....dis 30
Tinned Sauce Pans..... dis 30

Files.

Parkin's $5 to £..dis 45 ℔ cent
E.M. Boynton's, new list dis 25
J. & Riley Carr .....4.50 to £.
Johnson & Bro. .....dis 50
Butcher's.....4.50 to £.
Walter Spencer & Co.'s "Diamond".... 4.50 to £.
Fisher's.....4.75 to £.
Moss & Gamble.....4.50 to £.
H. Disston & Sons (new list)..... dis 45 per cent
Heller Bros.' Horse Rasps dis 35
Nicholson..... dis 45
New American..... dis 45
Union File Co..... dis 45

Grindstones.

Berea.....1@1½ ℔ lb
Ohio.....1¼@1⅝ ℔ lb
Nova Scotia.....1¼@1¾ ℔ lb
Lake Huron.....1@1¼ ℔ lb

Hammers.

Maydole's .....dis 15
Cheney's .....dis 25
Hartford Hammer Co....dis 20
Humason & Beckley.....dis 50
Verree.....dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75, dis25&10
Nelson Tool Works..dis 40&10
Warner & Noble's .....dis 5
Kip's .....dis 15

Hatchets.

Buckeye.....Shingling,
Nos...1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 40
Claw,
Nos...1, 2, 3,
℔ doz $8 25, $8 75, $9 25, dis 40
Lathing,
Nos.....1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 40

Hinges.

Champion double acting spring hinges .....dis. 30
Screw & Strap 8@12 in. .$5. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10
Clark & Co.....70&10

Locks.

Whipple Mfg Co ..... 50 & 5
Norwalk Lo Co .....45&10&10

Nails.

10 to 60d $3 00
8 and 9d 25
6 and 7d..... 50
4 and 5d..... 75
3d 1 50
2d 2 75
3d fine 3 00
2d fine 3 75
¾ inch 3 00
4d barrel 1 00
1¼ inch barrel nails..... 1 50
1½ do do do 1 75
1 do do do 2 50
¾ do do do 3 00
Cut spikes, all sizes..... 35
Clinch nails, all sizes..... 1 75
Casing and box nails..... 75
Finishing nails,.....$1 25
Tobacco nails. 50

Nuts and Washers

Nuts, square ..... 8c off list.
Nuts, hexagon..... 9c. off list.
Washers.....7c off list.

Nuts, Bolts, etc.

Machine Bolts .....dis 70
Bolt Ends .....dis 70
Boiler Patch Bolts.....net list

Picks.

Railroad, 4 to 5 lbs.. doz $6 60
5 to 6 lbs.. 7 20
to 7 lbs.. 7 80
7 to 8 lbs.. 8 40
Railroad Tamping Pick..
7 to 8 lbs..doz 10 80
Mill Picks per lb..... 75c

Planes.

Ohio Tool Co .....dis 20
Sciota .....dis 25
Bailey's Pat. Adjstbledis 20@10
Sandusky, fancy .....dis 15
Buckeye .....dis 20
Ogontz .....dis 25

Rivets.

on ..... dis 40
inned..... dis 40
opper ..... dis 50

Rules.

Stanley..... dis. 70 & 10

Squares.

Dis
Steel or iron, case lots..... 50
Try squares and T bevels.... 40

Spikes—Wrought

All lengths by ¼ inch 4½c
do do do 5-16 ..... 3½
do do do ¾, 7-16 & ½ in 3¼

Shovels and Spades.

Ames' new list, July 1, 1881,.....dis 15
Old Colony.....dis 15
Remington's (Lowman's Patent).....dis 30
Bishop .....dis 50
Chisholm.....dis 25@30
Rowland's .....dis 50
Griffiths ..... dis 50

Sad Irons.

From 4 to 10 lbs.. per lb 3 net
Self-Heating.....℔ doz $9 net
Tailors..℔ doz $18 net
Gleason's Shield and Toilet .....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott's Irons, square back.....dis 35
Enterprise Star Irons....dis 35
Combined Fluter and Sad Iron.....℔ doz $15, dis 15

Saws.

Disston.....dis 20
Disston's Circular .....dis 40
Disston's hand panel, rip, &c .....dis 20
Boynton's lightning cross cut new list .....dis 40
Boynton's circular and mill.....dis 40
Boynton's ice.....dis 25
Boynton's lightning hand panel and rip .....dis 25
Livingston's butcher and kitchen .....dis 20
Livingston's framed wood Nos. 101 102 103 104 105 doz $10 8.50 10 7.50 6.20 net
Peace circular & mill...dis 40
Peace hand panel and rip .....dis 25
Peace band saws, all widths.....dis 10

Scales.

Hatch, Counter, No. 171...
℔ doz. $42, dis 37½&10
Union Platform.....$6, dis 45
Fairbanks'..... dis 20
Buffalo Scale Co..... dis 40
Forsyth Scale Co.....dis 25
Howe's.....dis 20&10
Chatillon's Eureka.....dis 25
Family Universal.....dis 50
Scale Beams.....dis 33⅓&10

Screws.

Dis
Flat head iron or steel [new list] per cent dis. 55
Flat head brass 55
Round head iron or steel 50
Round head brass..... 45
Brass and Silver capped. 30
Japanned, list of Plain Screws..... 40
Coach, patent Gimlet point, list per 100 65
Lag, taper points..... 70
Bed 10
Machine, flat head, iron. 55
round head, iron 50
Bench, iron..... 55&10
wood, beech, per doz $3..... 10
wood, hickory ..... 20&10

Tinners' Tools & Machines

Machines (P. S. & W.) ... less 10
Tools (P. S. & W.) ..... " 20

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe dis 70&10
Mal'eable Iron Fittings... list
Grey Iron Fittings ....dis 50
Steam Brass Goods.....dis 55
Water " " ..... dis 50
Ludlow Gate Valves ..dis. 20
Register Gauge Cocks net 1 00
Montg'ry Gauge Cocks $1 each
Steam Gauges.....dis. 40
Steam Guages 5 in. net dial per doz.....30 00
Scotch Glass Tubes.....dis. 70
Tools.....special.
Duplex Injectors.....net.
Soil Pipe & Fittings, Mott's List.....dis. 30
Sinks, Mott's List.....dis. 25
Copper Bath tubs, sinks, etc.....dis. 25
Galvanized Iron Boilers "Scaifes."..... dis. 50
Marble Slabs, Counter-sunk net per ft.....$ 1 25

Sheet and Tank Rivets.

"Norway."

All sizes.....dis. 15

Boiler Rivets—"Albany."

⅛, ¾, 11-16, and ½ in. diam .5 00

Valves.

Dis.
Jenkins' Patent Gate Valves.35
" " Globe " ..40
" Standard Packing " 20

Vises.

Solid Box, list of July 1, '79,.....dis 45
Solid "Crown" (A. H. Hilldick)....40 to 100 lb, 15c net
Solid, Peter Wright's 15½
Solid, Wilkinson's.....18¾
Parallel, Parker's.....dis 40
" Simpson .....dis 20
" Prentiss.....dis 15
Saw Filers, Hopkins' ℔ doz $17.50, dis 10
" Wentworth's .. 9 00
Reading.....dis 45&10
Cowell Hand Vises.....dis 20
Richardson's Vise and Anvil.....dis 25

Wrenches.

Coe's genuine..... 50
Girard Standard....dis 50 & 10
Mechanics' 10 and 10....dis. 50
P. S. & W. Mechanics dis 50&10
Agricultural.....dis 70

Wire.

Brass and Copper.....dis 30
Bright & annealed, Nos. 0 @ 18 dis 50@55
" " Nos. 19 @ 26 dis 60
" Nos. 27 @ 36 dis 65
Coppered Nos. 0@18, dis 45@50
Galvanized, Nos. 0@18, market list,..... dis 45@50
Tinned, Nos. 0 @ 18, dis 45@47½
Cast steel.....dis 40
Tinned Broom Wire, Nos. 18@25.....dis 55
Annealed Fence, Nos. 8 and 9.....dis 60
Annealed Grape, Nos. 10 to 14.....dis 60
Galvanized Telegraph, Nos. 7 to 9 ..... ℔ l
Galvanized Telegraph, Nos 10 to 11 ..... ℔ lb 8¼c
Galvanized Telegraph, No. 12..... ℔ lb 10½c
Fence staples...℔ lb 5½@5¾c
Fence Staples, galvanized, ℔ lb 6½@6¾c
Stubs Steel Wire $6 00 to dis 30
Barb Wire, painted 7½8
Barb Wire, galvanized .. ¾c
Crucible Steel Ropes fro ¾ in. at 9c to 1¼ in. at.....52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at 33c

TINNER'S STOCK.

Tin.

Banca.....per lb. 23½
Straits..... " 23½c
English..... " 23c
Bar ..... " 24½c

Tin Plate,

IC 12x12 charcoal.....$ 6 75
IC 14x20 do 6 75
IX 14x20 do 8 75
DC 12¾x17 do 7 00
DX 12¾x17 do 9 00
DXX, 12¾x17 do 11 00
DXXX, 12¾x17 do..... 13 00
IC, 20x28 do 13 75
IX, 20x28 do 17 25
IC, 14x20, Best Roof..... 6 00
IX, 14x20, do 8 00
IC, 20x28 do 12 00
IX, 20x28 do 16 00
IC, 10x14 Best Coke..... 6 00
Subject to card discount.

Solder.

Half and Half, in bars.....15
No. 1 do 14
Spelter Solder.....25

Pat Planished Sheet Iron

[A] ..... per lb 10½c
[B] ..... " 9c

Nos	10	15	21	25
to	14	20	24 & 26	
Com	3-10	3-30	3-40	3-75
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ¼c extra.

Zinc.

Sheet, cask..... 6½c
Sheet, open..... 7c

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos not thinner than No. 28, wider than 2 in. not wider than 14 inch 30c
All Nos to No. 28 inclusive, and widths over 14 to 20 in. inclusive 35c
All Nos to No. 28, inclusive, and widths over 20 to 30 in. inclusive 38
¼c per lb advance on each No above Nos 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at 53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches 37c

Low Brass.

4c pr lb. more than High Brass
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal
In Bars 48c
Sawed 51c
Planed or Polished...54c

For Slitting.

Metal in width in. to ¼ in. to No. 28, inclusive, 1c per lb, advance.
Metal, in width 2 in. to 1 in. thinner than No 28, 2c per lb. advance
Metal, in width ½ in to ¼ in thinner than No 28, 5c per lb advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths add 7c per pound.

COPPER.

Lake Ingot.....15½@16c
Baltimore.....14¾@15
Arizona ..... 15@15¼c

sheathing Brazier Copper, Bolts, etc.
All sizes, 16 oz. per sq. foot and over, per lb 25c
and over per lb.....25c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb. 25c
Brazier's Copper, 10 oz. and 12 oz. per sq. ft...per lb. 27c
Brazier's Copper lighter than 10 oz. per sq. ft...per lb. 34c
Circles less than 84 inches in diameter ... per lb. 33c
Circles 84 inches in diameter and over .....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz. per sq. ft... per lb. 24c
Bolt Copper.....per lb. 28c
Copper Bottoms per lb. 31@32c
No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x48 ..... per sheet 6c
All other size sheets, 2½c per square foot For tinning both sides, double the above amount

LEAD.

Amere'n, ℔ lb..... 4¼c
Bar, ℔ lb.....5½c
Pipe, ℔ lb 6¾c dis 10 per c
Sheet, ℔ lb 7¼c dis 10 per t
Tin-lined pipe 15c dis 10 per ct
Block .....45c.
Chilled Shot... ..... 8c

Babbitt Metal.

Babbit Metal, No. 3, 14 X.....42
Babbit Metal, No. 2, 16 XX..46
Babbit Metal, No. 1, 18 XXX..50
Babbit Metal, C 30
Babbit Metal, B 24
Babbit Metal, A. 32
Dis 40 per cent.

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch..... 1 90
4¼ to 6 by ⅜ to 1 inch..... 2 00
1¾ to 6 by 1⅛ to 1½ inch 2 30
1¾ & 1¾ by ⅜ to ½..... 2 00
1 & 1¼ by ⅜ to ½..... 2 10
⅝ & ¾ and ⅞ by ⅜ to ½..... 2 30

Round,

1 to 1¾ inch 2 00
2 to 2¾ 2 10
2¾ to 3¼ 2 40
3¾ to 4 ..... 2 90
4¼ to 4½ 3 40
4¾ to 5 ..... 3 60

Square.

1 to 1¾ inch 2 00
2 to 2¾ 2 10
2¾ to 3¼ 2 40
¾ to 4 ..... 2 90
3¾ to ⅞ 2 00

Heavy Band.

1¾ to 6 by ¼ and 5-16 inch 2 10
1 to 1¾ by ⅜ and 5-16 do 2 20
¾ to ⅞ by ⅜ and 5-16 do 2 40
¾ to ⅞ by ¼ and 5-16 do 2 80

Half Oval and Half Round.

Wagon box iron ¾ and ⅝ 3 50
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¾ to 6 by ⅛ to 3-16..... 2 70

Hoops.

1¾ to 2 , Nos 16 to 18..... 3 10
1¾ to 4 do 13 to 15... 3 00
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24..... ..... 3 50
No 25 to 26..... 3 70
No 27..... 3 90
No 28 ..... 4 30

English Steel.

Best cast..... ℔ lb 16c
Extra cast..... 16½c
Round machinery.. 10c
Swaged, cast 18c
Best double shear ... 15½c
Blister, 1st quality.. 13c
Refined tool steel..... 16½c
Spring calking ..... 7¼@7½c
German steel, best .. 11c
2d quality 10c
3d quality 9c
Sheet cast steel, 1st quality 15½c
2d quality 14½c
3d quality 12½c

American Steel.

Best brands of refined cast steel, ⅜ to 2 inches. 12c
Crucible cast 7c
Open-hearth ditto 4½c
Hammer cast steel 9c
Spring cast steel..... 7½c
Bessemer and open-hearth spring..... 5c
Ditto plow..... 4½c
Steel boiler plate .... 6½@7c
Bessemer machinery .5 @6c
Spring and calking .. 7¼@7½c
Tire 5
Sleigh shoe..... 5

Bessemer Steel Tire.

⅜ to 1 by 3-32 ..... 4½ ℔ lb
⅜ to 1 by ½ to 5-32 ... 4½ ℔ lb
⅜ to 1 by 3-16 to ⅝ ... 4½ ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit..... 10
Axle steel for wagons..... 7
Frog points and plates..... 8
Frog size bars 8
Pick, hammered 10½
Mattock, beveled..... 9
Table cutlery 7½
Trap spring steel..... 10
Pike and cant hook..... 8½
Coal and granite..... 9

SCRAP IRON AND OLD METAL.

DEALER'S BUYING PRICES

	Per Ton
No. 1 R R wro't scrap....	$20
No. 1 wrought scrap.....	20
No. 1 Machine cast scrap.	14
Stove plate (free from burnt iron).....	11 00
Grate bars	7
Pipes and flues (clean)....	15
Tank iron.....	14
Hoop and band iron.....	10
Light sheet iron.....	0
Axle turnings.....	15 09
Wro't turning (f from cast)	13
Wro't iron, oily drillings.	9
Cast borings.....	9 00
Malleable iron.....	9
Uncut wro't iron boilers .	15
Old copper per lb.....	11
No. 1 H. Brass per lb.....	11
Heavy yellow Brass do..	9@10
Light Brass per lb.....	7@9
Scrap Zinc per lb.....	2@3
Tea Lead per lb	3
Heavy Lead per lb	4

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe

Inside Diameter. Inches.	Plain, Price Per Foot.	Galvan. or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	.24
¼	08	$0 11	.54	.42
⅜	09	12	.67	.56
½	11	15	.84	.85
¾	13½	19	1.05	1.13
1	19	28	1.31	1.67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2.69
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7.55
3½	1 25	1 70	4 00	9.05
4	1 50	2 05	4.50	10.73
4½	1 75	2 40	5.00	12 49
5	2 25	3 00	5.56	14.56
6	2 75	4 00	6.62	18.76
7	3 75	....	7.62	23.00
8	4 75	....	8.62	28.00
9	6 50	....	9.68	34.44
10	8 00	....	10.75	40.64
12	12 00	....		54.65

Discount, car load lots, 70 and 10 per cent Less than car load 70 to 70&5.

COAL,

WHOLESALE.

Wholesale f.o.b. cars at Cleveland:

Carbon Hill and Monday Creek.....	$2 50
Massillon	2 70@2 80
Palmyra, lump.....	3 25
Brier Hill.....	3 50
Pittsburgh	3 00
Salineville	2 25
Tuscarawas.....	2 40
Anthracite grate.....	5 40
Anthracite egg.....	5 40
Anthracite stove	5 71
Anthracite chestnut.....	5 85

RETAIL.—Delivered.

Massillon Lump.....	$4 00
" Nut	3 75
Carbon Hill and Monday Creek, lump	3 50
Carbon Hill and Monday Creek, nut	3 25
Straitsville, lump.....	3 75
Straitsville, nut	3 50
Palmyra, lump	4 50

75c less on cars by car load.

Anthracite Stove and Chestnut	6 50
Egg and grate	6 25

OILS.

Pure Oils. p'kages included

Sperm, winter bleached per gal.....	1 30@1 33
Whale, winter bleached per gal.....	63@66
Straits	45@50
Bank.....	45@47
Lard oil extra W S..	76@80
do No 1 do	68@73
do No 2 do	63@65
Tallow oil.....	73@76
Neatsfoot oil pure..	95@$100
do No 1	80@85
Linseed oil, raw	57@60
do do boiled	60@63
Cotton seed oil white	57@60
do do yellow	56@59
West Virginia lubricating 28 deg.....	15c@20c
Paraffine oil winter pressed.....	22@25
Capitol Cylinder.....	85
Model do	65
Eldorado Engine..	50
Turpentine, per gal..	48

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15.....	8 00
11x14 to 15x24.....	9 00
16x24 to 20x28.....	10 25
15x34 to 24x30.....	11 25
26x28 to 24x36.....	12 00
26x36 to 26x44	13 50
26x46 to 30x50.....	14 58

DOUBLE THICKNESS Dis 60&20

6x8 to 10x15.....	12 25
11x14 to 15x24.....	13 75
16x24 to 20x28.....	16 25
15x34 to 24x30.....	17 75
26x28 to 24x36.....	19 00
26x36 to 26x44.....	20 75

Dis 70

Books, Newspapers, Etc.

THE Pittsburgh Exposition Commissioners favor us with their handsomely gotten up announcement and review of the history and progress of the Smoky City.

WE congratulate the Cuyahoga Falls Reporter upon its recent enlargement and its new and attractive form. Mr. E. O. Knox, the proprietor, is a progressive journalist.

DR. DIO LEWIS'S new monthly magazine starts out exceedingly well. It is bright and crisp editorially and beyond criticism typographically. We wish the new venture abundant success.

"THE Commerce, Manufactures and Resources of Springfield, Mass.," is the title of a neatly arranged and profusely illustrated pamphlet, for the receipt of which we are indebted to the Vitrified Wheel Co., of Westfield, Mass.

"THE Button Charm" is the subject of a handsome frontispiece in August Wide Awake. The stories are remarkably fresh and entertaining, even for Wide Awake, and the sketches of travel (among them one by Edward Everett Hale) are peculiarly enchanting. D. Lothrop & Co., Boston, publishers.

THE most important article in the August Art Amateur is an exceedingly interesting account of "Japanese Pictorial Art and Artists," profusely illustrated. A four-page design of lilies and butterflies for a South Kensington screen panel is another noteworthy feature. The Art Amateur is steadily growing in usefulness and popularity. Price, 35 cents, $4 per annum. Montague Marks, publisher, 23 Union Square, New York.

The Newest Examples of Basic Steel.

At the Amsterdam Exhibition, says the Iron Trade Circular, new illustrations of the wide adaptability of the basic steel are shown in the collection contributed by Messrs. Thomas and Gilchrist, the inventors. The samples have been made at works in England, France, Germany, Belgium, and Austria. From the Creuzot Works of Messrs. Schneider there are some large samples of a remarkable character. They include plates which show extreme ductility and malleability. These have been beaten out, flanged and punched into the most trying shapes, yet they have borne the tests easily. Angle iron is shown bent into the form of the letter S, the upper and lower curves being of different sizes. A great variety of rail sections ranging from heavy down to very light sizes are shown from the works of Hoerder Autten Verein, of Germany; also tram-rails, together with specimens of steel sleepers. The tenacity of the material appears in specimens of rails and sleepers contributed by Teplitzer Nalzwerk, of Austria, and that are twisted and bent cold. As illustrating the different degrees of hardness of which steel may be made it is noteworthy that the rails contain 0.35 per cent of carbon, while the sleepers have only 0.08 per cent. Test pieces of the material from which the sleepers were rolled are shown to have a limit of elasticity 13·4 to 14·6 tons per square inch, a tensile strength of 25·4 to 27·6 tons per square inch, an elongation of between 29 and 33 per cent, and a contraction of area of between 53 and 63 per cent. Tubes flagged and bent close, cold, without the least sign of fracture. are exhibited by Witkowitzer Bergbau, of Austria. From the works of the Patent Shaft and Axletree Company, Wednesbury, (England), there are specimens of locomotive tubes and sheets and tin-plates, and also a Galloway tube with rivets. A fine collection of wire, both telegraph and ordinary, of different gauges, ranging from the finest to ordinary thick wire, is shown by Les Acieries d Angleur, of Belgium, and the amount of carbon contained is from 0·12 to 0·15 per cent.

A RECENT French process consists in permeating fabrics with a solution of tin. A mixture of zinc powder and dissolved albumen is first made, and spread over the fabric with a brush, and, after drying, the stuff is passed first through superheated steam, then through a solution of chloride of tin. In this way an exceedly thin layer of tin is spread over the whole side of the fabric, which is thus rendered waterproof, and protected against ordinary rough usage.

AN ENCOURAGING SHOWING.

[Continued from page 7.]

ANTHRACITE.

STATES.	In blast Jan. 1st.	In blast June 1st.	Furnaces July 1st. In.	Out	To ta	Tons of 2,240 lbs. One-half of 1882.	First six mos. 1883.
Massachusetts	.....	.....	...	1	1	.....	.....
New York	31	26	21	20	41	172,071	160,515
New Jersey	13	10	9	10	19	78,931	71,611
Pennsylvania	113	98	92	63	155	648,949	663,768
Maryland	4	3	3	2	5	11,718	10,976
Total	161	137	125	96	221	911,669	906,870

PRODUCTION ACCORDING TO FUEL USED.

KIND OF FUEL	In blast Jan. 1st.	In blast June 1st.	Furnaces July 1st. In.	Out	Total	Tons of 2,240 lbs One-half of 1882.	First six mos. 1883
Anthracite	161	137	125	96	221	911,669	906,870
Charcoal	129	105	98	149	247	311,565	250,719
Bituminous	127	109	111	109	220	1,088,428	1,194,430
Total	417	351	334	354	688	2,311,662	2,352,019

PRODUCTION OF PIG IRON IN CERTAIN DISTRICTS.

	DISTRICTS.	In blast Jan. 1st.	In blast June 1st	Furnaces July 1st. In.	Out	Total	Tons of 2,240 lbs. One-half of 1883.	First six mos. 1883
Pennsylvania.	Lehigh V.	44	38	35	16	51	272,026	279,677
	Schu'l "	29	21	19	26	45	152,991	157,980
	U. Sus. "	14	13	1	11	23	89,896	68,431
	L. Sus. "	26	26	26	10	36	134,036	157,680
	Shen. "	12	13	12	17	29	117,892	127,783
	Alle'y Co.	11	14	14	2	16	160,197	260,299
	Mis. coke	24	19	17	21	38	144,070	143,651
	Charcoal	25	19	16	21	37	22,310	16,310
Ohio.	H.R coke	10	9	9	5	14	34,538	35,757
	Mah. Val.	13	8	10	8	18	115,392	107,951
	Hock "	6	4	4	10	14	35,165	26,852
	Mis. coke	14	7	8	12	20	100,729	132,648
	H.R. char.	18	12	13	11	24	24,797	14,512
	Mis. char.	1	1	..	3	3	1,388	1,518

Stocks of Pig Iron on Hand and Unsold.

STATES.	Charcoal. Tons of 2,240 lbs. Dec. 31, 1882	Charcoal. June 30, 1883.	Bituminous. Tons of 2,240 lbs Dec. 31, 1882	Bituminous. June 30, 1883
New England	8,809	11,805	.....	.....
New York	11,205	14,758	.....	.....
Pennsylvania	9,144	7,991	64,742	97,936
Maryland	4,949	2 717	.....	315
Va., N. C., Ga , and Tex	17,127	13,597	5,251	7,478
Alabama	14,842	10,662	3,076	2,256
West Virginia	.....	.....	3,811	5,194
Kentucky	6,486	5 400	3,502	900
Tennessee	9,339	11,000	2,618	13,595
Ohio	25,280	19,186	52,625	42,994
Michigan and Indiana	24,172	30,241	2,232	600
Illinois	.....	.....	800	12,858
Wisconsin and Minnesota	5,179	6,793	.....	7,130
Missouri	11,003	10,870	1,696	4,823
Colorado and Pacific States	.....	800	.....	.....
Total	147,535	145,756	140,353	196,099

ANTHRACITE PIG IRON.

STATES.	On hand Dec. 31, 1882.	On hand June 30, 1883.
New York	22,583	50,580
New Jersey	10,873	25,870
Pennsylvania	60,809	107,335
Maryland	1,551	2,950
Total	95,767	186,735

STOCKS OF PIG IRON IN CERTAIN DISTRICTS.

Pennsylvania.	Lehigh Valley anthracite	22,294	47.776
	Schuylkill Valley anthracite	21,454	37,408
	Upper Susquehanna "	9,976	8,468
	Lower Susquehanna "	7,085	13,683
	Shenango Valley coke	19,683	25,354
	Allegheny County coke	15.421	32,418
	Miscellanous coke	29.638	40.184
	Charcoal	9,144	7,991
Ohio.	Hanging Rock coke	11,257	8,496
	Mahoning Valley coke	22,029	18,093
	Hocking Valley coke	5,455	7,411
	Miscellaneous coke	13,884	8,994
	Hanging Rock charcoal	24,541	18,936
	Miscellaneous charcoal	739	250

STOCKS ACCORDING TO FUEL USED.

Bituminous	140,353	196,099
Anthracite	95,767	186,735
Charcoal	147.535	145,756
Total	383,655	528,590

Startling Discovery in Blasting.

A very startling piece of information comes to us from the Rive-de-Gier (France). A block of ore, weighing some thirty-five pounds, was broken into small pieces and placed into a melting furnace. When the ore reached the red-hot temperature a reagent was added and the fusion of the new ore was complete in three minutes. This fusion was iron, and the reagent cost only eighteen cents per ton of the metal obtained. A blast furnace would thus produce twenty-two tons of iron every fourteen minutes, instead of every twelve days. Besides this, the furnace would clean itself at every opeartion. The experiments were made at the iron works of M. Brunon, and should these statements be proved, metallurgical interests would have to conform to another transformation not less important than that involved in the Bessemer steel process.—[Engineering News.

A Submarine Balloon.

The London News says: "The International Exhibition of Nice is reserving some wonders for the foreigners who may propose to pass a a portion of the winter 1883 upon the borders of the Mediterranean. One of these wonders is a balloon which its inventor, M. Toselli, calls "the observatory under the sea." It is made of steel and bronze, to enable it to resist the pressure which the water produces at a depth of 120 metres. This "observatory under the sea" has a height of eight metres, and is divided into three compartments. The upper apartment is reserved for the commander to enable him to direct and to watch the working of the observatory and to give to to the passengers explanations necessary as to the depth of the descent, and what they will see in the depths of the sea. The second apartment, in the centre of the machine, is comfortably furnished for passengers to the number of eight, who are placed so that they can see a long distance from the machine. They have under their feet a glass which enables them to examine at their ease the bottom of the sea, with its fishes, its plants, and its rocks. The obscurity being almost complete at seventy metres of depth, the observatory will be provided with a powerful electric sun, which sheds light to a great distance in lighting these depths. The passengers have at their disposal a telephone, which allows them to converse with their friends who have stopped on the steamboat which transports the voyagers to such places as are known as the most curious in the neighborhood. They have also handy a telegraph machine. Beneath the passengers an apartment is reserved for the machine, which is constructed on natural principles—that is to say, as the vessile of a fish, becoming heavier or lighter at command, so as to enable the machine to sink or rise at the wish of the operator."

A Useful Kind of Solder.

A soft alloy which attaches itself so firmly to the surface of metals, glass, and porcelain that it can be employed to solder articles that will not bear a very high temperature can be made as follows: Copper dust obtained by precipitation from a solution of the sulphate by means zinc is put in a cast iron or porcelain lined mortar and mixed with strong sulphuric acid, specific gravity 1.85. From 20 to 30 or 36 parts of the copper are taken, according to the hardness desired. To the cake formed of acid and copper there are added, under constant stirring, 70 parts of mercury. When well mixed, the amalgam is carefully rinsed with warm water to remove all the acid, and then set aside to cool. In ten or twelve hours it is hard enough to scratch tin. If it is to be used now, it must be heated so hot that when worked over and brayed in an iron mortar it becomes as soft as wax. In this ductile form it can be spread out on any surface, to which it adheres when it gets cold and hard.—[Amateur Mechanics.

SPECIAL machines are used much more in England than in this country. Here is an account of some boiler-shop machines recently made in England: "Another special machine was a circular planing machine for dealing with the plates after they have been bent. In this machine the plate forms the guide for the tool, so that whatever the shape of the plate is itself, the path for the slide which carries the tool box and a specially arranged balance weight comes into action to keep the tool always to its work, whether traveling upwards over one-half, or downwards over the other half of the plate. Among other interesting processes was the flanging of marine boiler and plates which is done by a powerful hydraulic press. By this machine boiler-ends 18 feet diameter, 1-inch thick, with 10-inch flanges, can be flanged in two places, and the furnace holes flanged at the same time. The plate to be flanged, after being sheared to the size required, is heated to a red heat all over. It is then drawn from the furnace into the press and is held against the upper dies by a die-plate carried by a series of rams. The main rams then lift the table with the blocks, which turn up the overhanging edges of the plate, thereby forming the flange."

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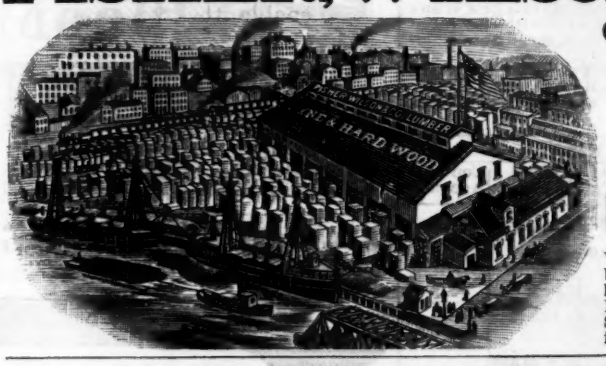

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THE MONOLITH.

New Telephone Companies.

A new company has been formed at Davenport, Iowa, to be known as the Iowa Union Telephone Company. The capital is $2,000,000. The Central Union Telephone Company, recently licensed under the laws of Illinois, and operating under the American Bell Telephone Company of Boston, has purchased the property of the Midland, Western and Central Telephone Companies, embracing the States of Ohio, Indiana, and Illinois, and the principal towns of Iowa.

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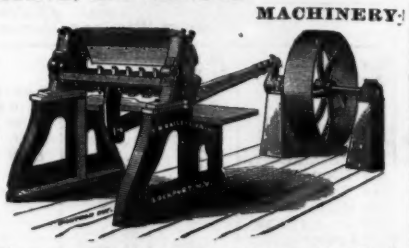

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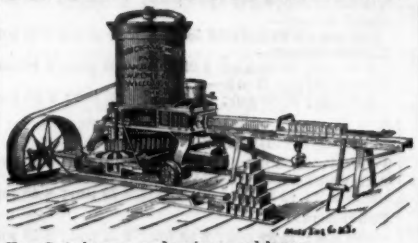

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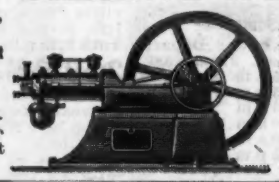

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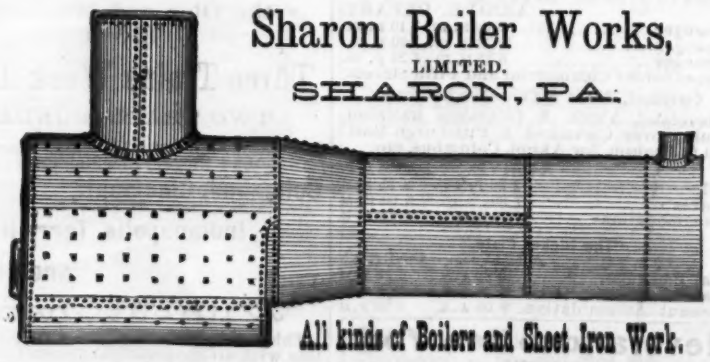

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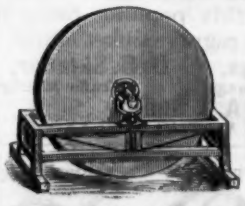

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N.Y.,Bo't'n & At. Ex.	*7 05 a m	*7 30 a m
Elyria Accommodation	†8 35 a m	.....
Pt.Clinton Accom'd'at'n	†11 00 a m	.....
Buffalo Accommodation	†11 00 a m	†11 15 a m
N. Y and B't'n Fast Ex.	*2 25 p m	*2 55 p m
Conneaut Accom'dation	.....	†4 50 p m
Night Express	†10 10 p m	†10 35 p m
TRAINS GOING WEST.	**Arrive. From East**	**Depart. From west.**
Fast Limited Express	*12 23 a m	*12 33 a m
Mich. Ex. via Sandusky	*2 50 a m	*3 05 a m
Chi. Ex. via Sandusky	†6 35 a m	7 00 a m
Mich. Ac. via Norwalk	.....	†6 40 a m
Conneaut Accom'dat'n.	†8 40 a m	.....
Toledo Ex. via Norwalk	†1 25 p m	†3 30 p m
St. Louis Ex.via San'ky	*1 40 p m	*2 05 p m
Chi. Pac.Ex. via Nor'lk.	*7 05 p m	*7 35 p m
Pt.Clinton Accom'dat'n	.....	†5 00 p m

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Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

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No. 2 Col. & Cin. & Ind'polis Ex.	*7 10 A.M
No. 8 C. L. & W. and Galion Exp	9 30
No. 12 St. Louis & New York Exp.	*3 20 P.M
No 6 Indianapolis & Columbus Exp	10 00
No. 4 Columbus & Cincinnati Exp.	*3 50
No. 10 Wheeling Express	7 15
No. 14 Cincin. New York fast line,	1 40 A.M

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	*8 00 A.M
No. 11 Cleve, Indianap.&Wheel'g Ex	7 10
No. 3 Special St. Louis & Cin. Ex.	**2 15 P.M
No. 5 Night Express,	*7 10
No. 7 C. L. & W. and Galion Exp	5 00
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ARRIVALS.

Wheeling & Cleveland Express	7 15 P.M
Uhrichsville Express	9 30 A.M

DEPARTURES.

Wheeling & Cleveland Express	7 10 A.M
Uhrichsville Express	5 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 1 New York Expaess	* 6 40 a.m.
No. 7 Mahoning Valley Ac	11 55 a.m.
No. 5 Fast N. Y. & Pitts. Ex	* 1 40 p.m.
No. 3 N. Y. & Pittsburgh Ex	* 7 05 p.m.
No. 9 Youngstown & Pitts. Ac	10 15 p.m.

DEPARTURES.

No. 12 N. Y. & Pitts. Express	* 7 20 a.m.
No. 6 Youngstown & Pitts Ac	11 05 a.m.
No. 4 Fast N. Y. & Pitts. Express	* 2 50 p.m.
No. 2 Mahoning Accommodation	4 35 p.m.
No. 8 N. Y. and Pitts. Express	11 05 p.m.

* Sunday trains.

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Pittsburg & Wheeling	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Alliance Accommodation	10 10 A.M	3 45
Ravenna Accommodation	8 37	5 30
Night Express	6 25 A.M	†11 40 P.M
Newberg Accom'dation	12 10 P.M	11 00 A.M
Newberg Accom'dation	1 50 P.M	12 30 P.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

	ARRIVE.	DEPART
Wheeling Junction	10 15 A.M	8 30 A.M
Canton	1 35 P.M	6 15 P.M
Wheeling Junction	6 15 P.M	3 20 P.M

Special trains leave on Sunday at 4.20 P.M., arriving at Cleveland at 7.15 P. M.

Depot foot of South Water Street.

Connotton Valley Railway.

	ARRIVE.	DEPART.
Passenger	8 00 a. m.	8 10 a. m.
Passenger	10 20 a. m.	2 00 p, m.
Passenger	6 35 p. m.	4 25 p. m.

Depot corner Commercial and Fifth Streets

Cleveland, Akron & Columbus Railroad,

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Rail road to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	2 30 P.M	8 25 A.M
Express	7 30	2 00 P. M
Accommodation	10 10 A.M	3 45 P. M

"The Nickel Plate."

	ARPIVE.	DEPART
Local Passenger	10 00 P.M	3 48 P.M
Local Passenger	9 18 A.M	6 55 A.M
Conneaut Accom'dation	9 05 A.M	4 30 P.M

Cleveland to New York,

VIA THE

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

[Formerly Atlantic & Great Western Railroad]

For New York, Boston and the East. The shortest and quickest route to Pittsburgh Washington, Baltimore and the Southeast.

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7 20A.M. LIGHTNING EXPRESS (daily) sleepingand hotel coaches from Leavittsburg, 9:05 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p. m.; Buffalo, 6:15 p. m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p. m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

2:50P.M. LIMITED EXPRESS, Pull-Sleeper Cleveland to New York, (daily). Arrives at Meadville, 6:55 p m.; Jamestown, 9;13 p. m.; Salamanca, 10:10 p. m.; Now York, 10:25 a. m.

11:25 P.M. NIGHT EXPRESS, (daily ex cept Sunday), Sleeping Coach from Leavittsurg to New York without change. Arrives at Youngstown, 1:45 a.m.; Pittsburgh, 6:15 a. m.; Washington 9:15 a. m.; Baltimore 10:34 p. m.; Meadville, 8:50 a. m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a. m.; Rochester, 1:10 p. m.; Hornellsville 1:20 a. m.; Corning, 12:53 p. m.; Elmira 1:21 p. m.; Binghampton, 2:50 p.m.; New York 9:25 p.m.

2:50 P.M. PITTSBURGH EXPRESS, daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:19 a.m

4:35 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p. m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:20 A.M. PITTSBURGH EXPRESS, —(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p. m. and 4:20 p.m.

11:05 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:40 a.m., 7:05 p. m., 10:55 a. m 1:40 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK,
Gen. Pass'r. Agt., Cleveland, Ohio.
M. L. FOUTS.
J. M. FERRIS, Pass. Agt..131 Bank st.,
Gen. Man'gr, Cleveland Cleveland.

TIME TABLE. CLEVELAND & PITTSBURGH

RAILROAD.

On and after Sunday, January 21st, 1883, trains depart from and arrive at Union Station, Cleveland, (city time) as follows:

DEPART.

For the East--8:20 A.M.; 1:55 P.M., 11:35 P.M
For Alliance--3:40 P.M.
For Ravenna--5:25 P.M.
For Newburgh--10:55 A.M; 12:95 P.M.
On Sunday for the East, at 11:35 P.M.

Train leaving for the East (week days) at 1:55 P.M. has sleeping car through to Philadelphia and New York.

Train leaving for the East every night at 11:35 has sleeping car to Pittsburgh.

On Saturday night the train for the East leaving Cleveland at 11:35 runs from Alliance to Pittsburgh via P.F.W. & C. Railway.

ARRIVE--(Week Days.)

From the East--6:20 A.M.; 2:25 P.M.; 7:25 P.M
From Alliance--10:05 A.M.
From Ravenna--8:32 A.M.
From Newburgh--12:05 P.M.; 1:45 P.M.

Time tables, rates of fare, through tickets and further information can be obtained from M. G. Carrel, agent, Union Station, or C. L. Douglass, No. 212 Bank street.

WM. A. BALDWIN, Manager, Pittsburgh, Pa.
E. A. FORD, Gen. Pass. Agt.

Bee Line.

Cleveland, Columbus, Cincinnati & Indianapolis Railway.

The Great Central Trunk Route to the Ohio and Mississippi Rivers.

Three Trains Week Days,

TWO TRAINS SUNDAY.

Leave Cleveland with Through Palace Coaches and Elegant Sleeping Cars for

Columbus, Cincinnati,

Indianapolis, Terre Haute

and St. Louis

Without Change.

This is the only line making Direct Connection with all the principal Trunk Lines of the East for all Southern, Southwestern and Western points, either by way of Cincinnati, Indianapolis or St. Louis for all railway towns in Missouri, Arkansas, Texas, Kansas, Nebraska, Colorado, New Mexico, Old Mexico and the Pacific Coast.

Equipment New and Comprising all Modern Improvements.

The Best Roadbed and Safest Road in the West.

Tickets by this popular route for sale at all regular ticket offices.

E. B. Thomas, General Manager. **O. B. Skinner,** Traffic Manager.

A. J. Smith, Gen'l Pass. Agent, CLEVELAND, O.

Address, TAYLOR MFG. CO.

(Please Mention this Paper.) Chambersburg, Pa.

Blue Grass Route of Ohio

TIME TABLE.

In effect July 16, 1883.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

SOUTH-BOUND TRAINS

	Mail.	Expr'ss.	Acc'm	Acc'm
Leave.				
Cleveland	8 25 am	2 30 pm	3 45pm	.....
Hudson	9 40	3 35	5 00	.....
Cuyahoga F's.	9 58	3 53	5 24	.....
Akron	10 14	4 08	5 40	.....
Clinton	10 45	4 44	6 11	.....
Warwick	10 50	4 49	6 16	.....
Orrville	11 14	5 15	6 40	.....
Fredricksburg	11 45	5 46	7 13	a. m.
Millersburg	12 08 pm	6 08	7 35 ar	5 25
Gann	15 55	6 58	.....	6 15
Danville	1 07	7 09	.....	6 26
Gambier	1 27	7 29	.....	6 46
Mt. Vernon	1 55 D	7 54	.....	7 15 B
Centerburg	2 26	8 27	.....	7 50
Westerville	2 10	9 10	.....	8 38
Columbus arr.	3 35	9 35	.....	9 05

NORTH-BOUND TRAINS

STATIONS.	Expr'ss.	Mail.	Acc'm	Acc'm
Leave				
Columbus	7 10 am	12 10 pm	.....	5 20 pm
Westerville	7 35	12 34	.....	5 48
Centerburg	8 17	1 16	.....	6 33
Mt. Vernon	9 02 B	2 00 D	.....	7 19 S
Gambier	9 14	2 11	.....	7 29
Danville	9 34	2 29	.....	7 49
Gann	9 46	2 40	.....	8 01
Millersburg	10 38	3 27	5 45am	8 50 arr
Fredricksb'g	11 00	3 47	6 06	.....
Orrville	11 33	4 17	7 10 B	.....
Warwick	11 56	4 39	7 37	.....
Clinton	12 02 pm	4 44	7 46	.....
Akron	12 35	5 14	8 20	.....
C'yahoga F's	12 50	5 26	8 33	.....
Hudson	1 10	5 43	8 53	.....
Ar. Clevel'd	2 25	6 55	10 10	.....

B Breakfast. D Dinner. S Supper.

N. MONSARRAT, Gen'l Supt. Akron, O
E. T. AFFLECK, General Passenger Ag't, Columbus, O.

THE NICKEL PLATE.

New York, Chicago & St. Louis Railroad.

The passenger equipment of this new trunk line is all new and is supplied with the latest appliances necessary to safe, speedy and comfortable travel.

At Chicago, Passenger Trains arrive at and leave Union Depot, Van Buren street.

Following is the time in effect May 14, 1883, and until further notice:

GOING EAST.

	Local Pass'n'gr	Local Pass'ngr.	Con'eaut Accom.
Lv. Chicago	8 15 am	.....	.....
Ar. Valparaiso	10 05	.....	.....
" Ft. Wayne	1 30 pm	.....	.....
" New Haven	2 05	.....	.....
" West Leipsic	4 09	.....	.....
" Arcadia	5 10	.....	.....
" Fostoria	5 25	.....	.....
" Gr. Springs	6 12	.....	.....
" Bellevue	6 40	.....	.....
Lv Bellevue	6 75	8 30 am	.....
Ar Cleveland	9 20 pm	10 55	.....
Lv Cleveland	.....	11 00	5 00 pm
Ar Painesville	.....	12 06 pm	6 15
" Ashtabula	.....	12 58	7 11
" Conneaut	.....	1 25	7 40
" Erie	.....	2 28	.....
" Dunkirk	.....	4 21	.....
" Buffalo	.....	6 00	.....

GOING WEST.

	Local Passn'gr.	Local Pass'ngr.	Con'eaut Accom.
Lv Buffalo	10 15 am	.....	.....
Ar Dunkirk	11 56	.....	.....
" Erie	1 35 pm	.....	Leave.
" Conneaut	2 53	.....	6 10 ar
" Ashtabula	3 25	.....	6 39
" Painesville	4 19	.....	7 36
" Cleveland	5 25	.....	8 50
Lv Cleveland	5 30	7 15 am	.....
Ar Bellevue	7 55	9 30	.....
Lv Bellevue	.....	9 40	.....
Ar Gr. Springs	.....	10 07	.....
" Fostoria	.....	10 46	.....
" Arcadia	.....	11 00	.....
" West Leipsic	.....	11 58	.....
" New Haven	.....	2 05 pm	.....
" Ft Wayne	.....	2 20	.....
" Valparaiso	.....	6 25	.....
" Chicago	.....	8 20	.....

FOR ROCKY RIVER.

Commencing Sunday, June 17, 1883, trains between Cleveland and Rocky River, (on Sundays only), will run as follows:

WESTWARD.

Leave Cleveland—(Broadway Station)
8 15 a m; 9 50 a.m; 12 50 p.m; 4 10 p.m; 7 00 pm.
Pearl Street—
8 23 am; 9 58 am; 12 58 pm; 4 18 p m; 7 08 pm.
Lorain Street—
8 30 am; 10 05 am; 1 05 pm; 4 25 pm; 7 15 am.
Arrive River Bank—
8 55 am; 10 30 am; 1 35 pm; 4 50 pm; 7 40 pm.

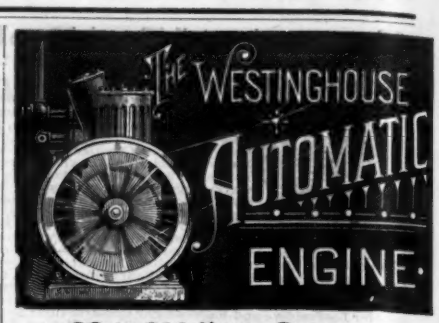
EASTWARD.

Leave River Bank—
9 00 am; 12 00 noon; 3 20 pm; 6 00 pm; 8 20 pm.
Arrive at Cleveland (Lorain Street—
9 25 am; 12 25 pm; 3 45 pm; 6 25 pm; 8 45 pm.
Pearl Street—
9 32 am; 12 32 pm; 3 52 pm; 6 32 pm; 8 52 pm.
Broadway Station—
9 40 am; 12 40 pm; 4 00 pm; 6 40 pm; 9 00 pm.

Trains run by Columbus time, which is twenty minutes faster than Chicago, five minutes slower than Cleveland, and sixteen minutes slower than Buffalo time.

For information, call on nearest Agent of the Company or address

B. F. HORNER, Gen'l Passenger Agent,
LEWIS WILLIAMS, General Manager, Cleveland, O.



30 to 300 Horse Power.

Send for Illustrated Circular and Reference List.

State the Horse Power required, and

ASK OUR PRICES!

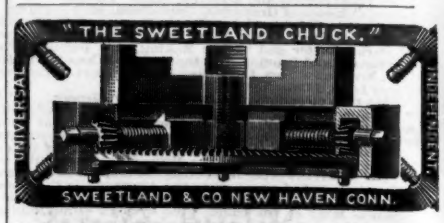
Especially adapted to Direct Connection to Shafting and Machinery.

The Westinghouse Machine Comp'y

PITTSBURCH, PA.

Address, if more convenient, our { 94 Liberty St., NEW YORK, 14 So. Canal St., CHICAGO, Branch Offices: { 401 Elm St., DALLAS, TEXAS

13



ALLIGATOR WRENCHES,

For Pipe and Round Iron.

S. A. SMITH,
154 Lake Street, Chicago.
Agent for the Western States. 52

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AMERICAN

Graphite Pencils

S—Soft.
S M—Soft Medium.
M—Medium.
H—Hard.
V H—Very Hard.

JOS. DIXON CRUCIBLE CO.
Jersey City, N. J.

PECK'S PAT. DROP PRESS

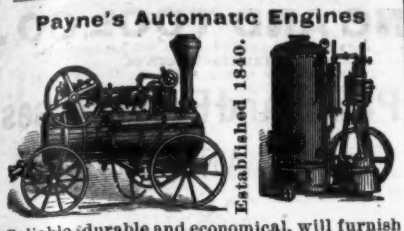
BLAST FORGES.

STEEL & IRON DROP FORGINGS

Drop Dies and Special Machinery.

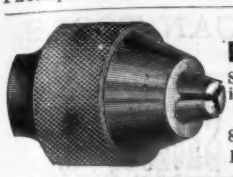
BEECHER & PECK, NEW HAVEN CONN.

Payne's Automatic Engines



Established 1840.

Reliable, durable and economical, will furnish a horse power with ⅓ less fuel and water than any other engine built, not fitted with an automatic cut-off. Send for illustrated Catalogue No. 20 for information and prices. B. W. PAYNE & SONS, Box 1436, Corning, N. Y.



ALMOND
DRILL CHUCK.
Sold at all Machinists' Supply Stores.
T. R. Almond,
84 Pearl street, 8
BROOKLYN, N. Y

THE **HOTCHKISS MECHANICAL**
BOILER CLEANER
AN AUTOMATIC DEVICE
FOR REMOVING MUD
AND
Preventing Scale
AND FOAMING.
Patented 1875.

Simplest, Best and Cheapest. "How to Keep Boilers Clean," a 72-page book, sent free to any address, on sending your name on a Postal Card. **James F. Hotchkiss,**
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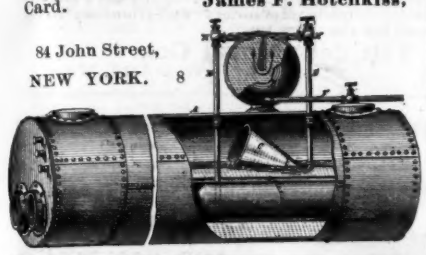
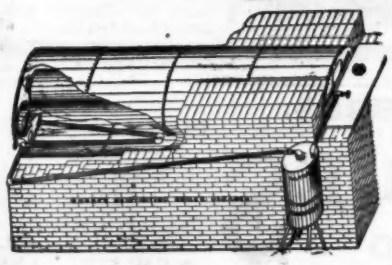
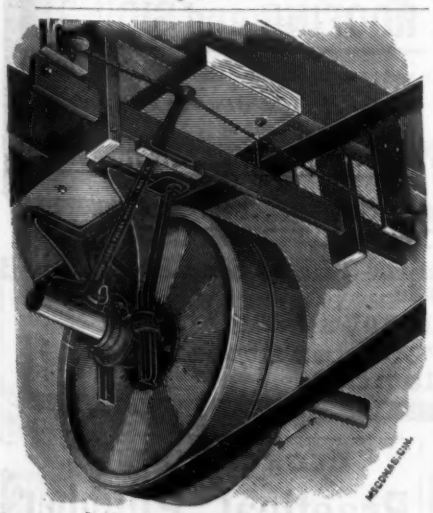
NEW YORK. 8



Sharp's



Self-Acting Boiler Cleaner,
Warranted in Every Respect.
Thos. Sharp & Co.,
Salem, O.
Send for Circulars and Price List.
Mention this Paper. 74



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Taper Sleeve Pulley Works,
MANUFACTURERS of Taper-Sleeve Wood Belt Pulleys, Taper Sleeve and Compression Couplings, Adjustable Dead Pulleys, Wood Pulleys, Split or made in Halves, Friction Clutch Pulleys, and Friction Clutch Couplings. You can start a load with this clutch, at any speed, with ease and safety.
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Cleveland Foundry.
CASTINGS
For Machinery and Rolling Mills.
Car Wheels
all sizes and kinds, with and without Axles.
Chilled Faced R. R. Frogs.
STREET RAILROAD TURNOUT.
Nos. 9, 11, and 13 Winter Street.
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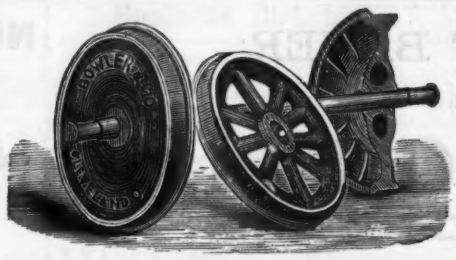

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W. C. BENNETT & CO.,
20 to 30 per cent. saved by ordering direct of us, in quality and price.

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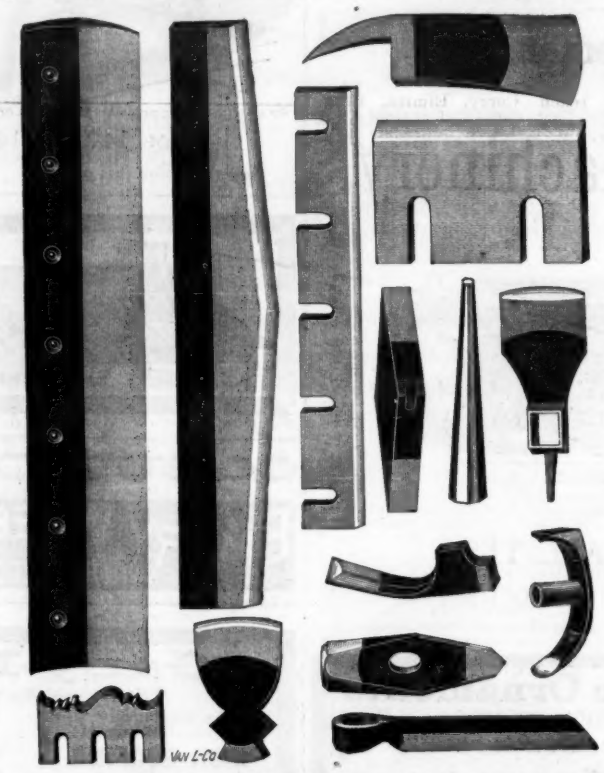
PLANING MILLS - - - - OF MICHIGAN.



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HOOP MANUFACTURERS - - - OF MICHIGAN.
WE SUPPLY - - - - - THE WHOLESALE TRADE.

WRITE US; GET OUR PRICES AND ILLUSTRATED CATALOGUE AND BLANK PAPER PATTERN
for ordering what you want. **W. C. Bennett & Co.**

CLIMAX COOK

Specially Designed for the Western Market.

OVEN NO. 8—20x21¼x13 Inches. OVEN NO. 9—22x23¼x14 Inches.

Has peculiar and important features that make it the best operating stove in the market, and commend it to the favorable notice of dealers who desire a first class stove.

It is constructed with our patent flue, which descends in the rear and ascends in front between oven and fire-box, forming a wide flue around back, bottom and front of oven, insuring an easy draft and uniform heating of all parts of oven.

The Reservoir is of planished copper, with deep, stamped pit, protected with cast iron, and is effectually heated without an extra damper. By removing Reservoir and supplying its place with cover plates, a complete six-hole stove is obtained

The fire-back is in three heavy interchangeable pieces. A water-back is provided which occupies the same space as fire-back, heats perfectly and does not retard the heating of oven, for reasons of the intervening flue between it and oven.

The grate is hinged at its extreme back edge, and when dumped gives a clear opening into a large ash-pan. It can be partially dropped to remove clinkers from the front.

A receptacle for the covers, when removed from top of stove, is hung on swing bracket under front hearth.

Its neat design, nicely polished edges, nickeled panel plates and trimmings, give it a very attractive appearance.

Send for prices. ——MANUFACTURED BY——

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Patent Law
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Send for 140 page instruction book.

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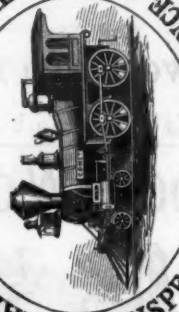
HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO.



GEO. P. BURWELL, Gen. Agent,
246 Superior Street,
CLEVELAND, O.
A. C. GETCHELL,
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Manufacturers of
High and Low Speed
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BOTH
UPRIGHT AND HORIZONTAL
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CIRCULAR SAW MILLS.
STEAM PUMPS,
IRON AND BRASS CASTINGS.
Patent Sets and Head Blocks for Saw Mills, and Machinery of all descriptions. I now have the agency for the celebrated
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and can supply customers with anything in this line at very low prices.
Call at Works and see them in Stock.
Also manufacturers of
The Ætna Engines.
These are an entirely new style of Upright Engines, designed by F. I. Freeman, and
PATENT APPLIED FOR.
They are so constructed that they can be sold for one-half the price for the ordinary style of the same sizes or power, consequently they are by far the
Cheapest Engines in the Market
And are warranted satisfactory in every respect They are designed especially for Saw Mills, Grist Mills and Hoisting Machines, and are high or low speed engines, running from one to seven hundred revolutions per minute; are strong and heavily built, of the best material and workmanship.
☞ Parties interested will find one in operation at the works. Call and examine for yourselves Sizes range from eight to one hundred horse power.
Also dealers in Gas and Pipe Fittings, Globe Valves, and
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Prompt Attention given to Repair Work.
☞ Parties wishing to buy or sell second-hand Machinery will do well to call.
Corner Vernon and Hudson Streets,
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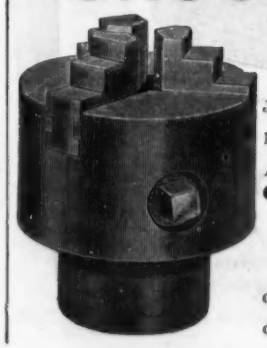
WARREN OHIO.

CHUCKS.



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and
Independent Jawed Chucks
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AND SPECIAL MACHINERY OF ALL KINDS.

—GENERAL DEALER IN—

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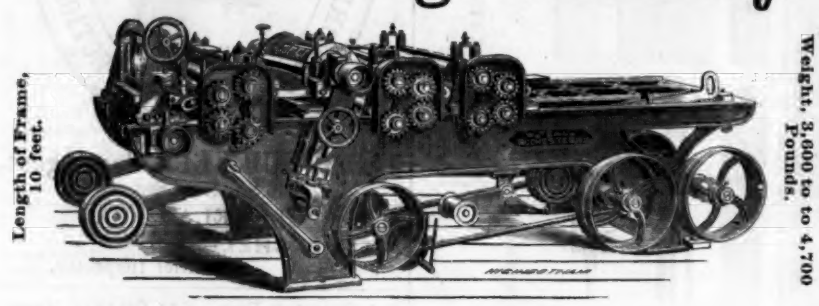
Wood-Working Machinery.



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To plane on side and match, 4 rolls,	$500
To surface 1 side without matching 4 rolls,	400
To plane one side and match, 6 rolls,	565
To plane two sides and match, 6 rolls,	650
To plane 2 sides without matching, 6 rolls,	500

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Copper-coated Spun Zinc Ornaments

FOR GALVANIZED IRON CORNICE MANUFACTURERS.

Balusters, Urns, Finials, Sign Mortars, Bracket Fronts, Half and Whole Balls, etc.

Send detail Drawings by mail or express, at our expense, for estimates.

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STEAM FITTERS, MACHINISTS AND BRASS FOUNDERS.

Manufacturers of, and Dealers in

Plumbers', Gas and Steam Fitters' Supplies.

Sole Manufacturers of the 64

WORSWICK PATENT RADIATORS

Leetonia Tool Co.

Leetonia, O.

Manufacturers of

Axes, Picks

Mattocks, Sledges, &c.

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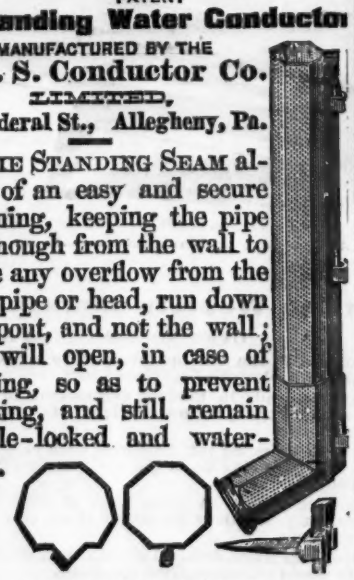

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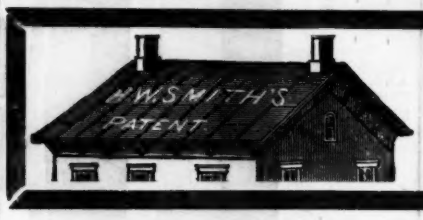

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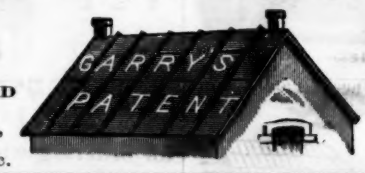

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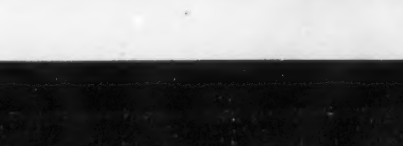
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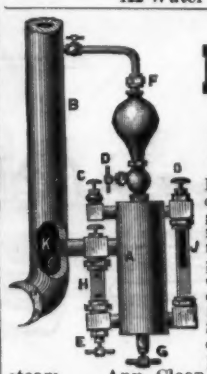

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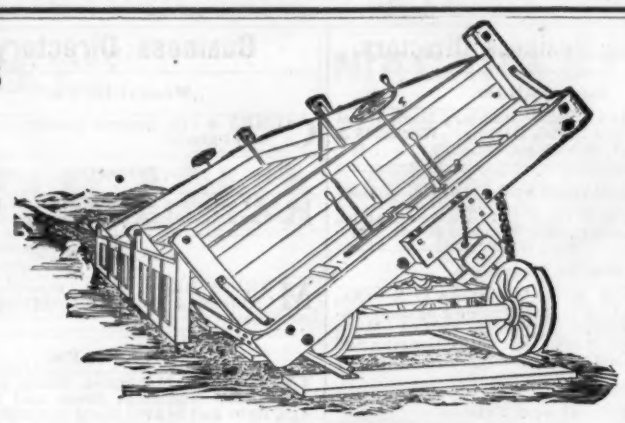
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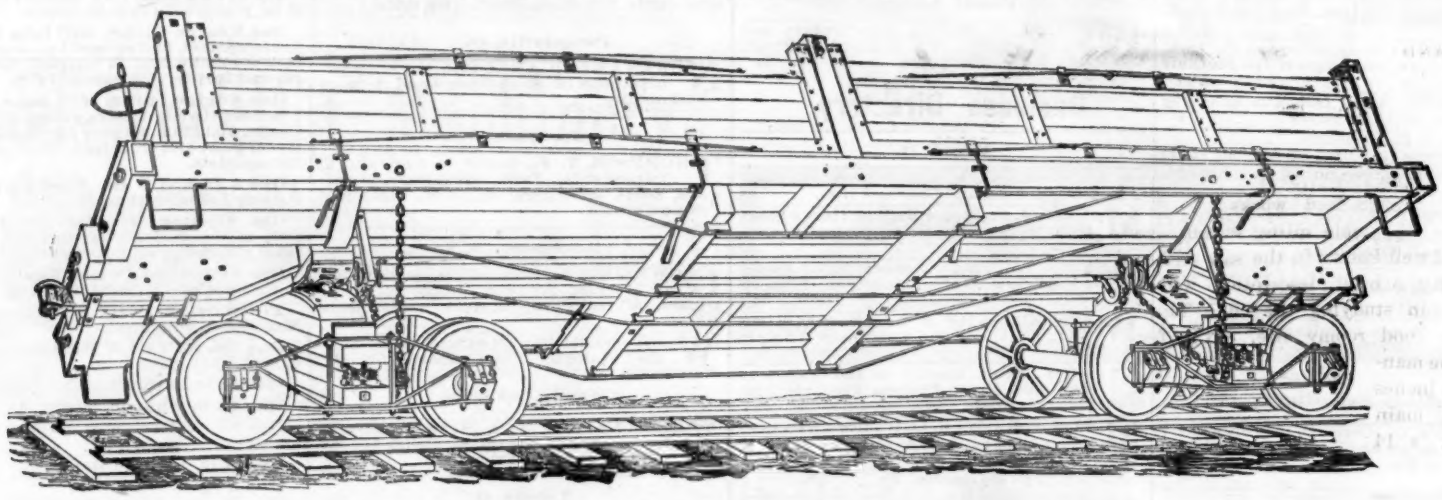
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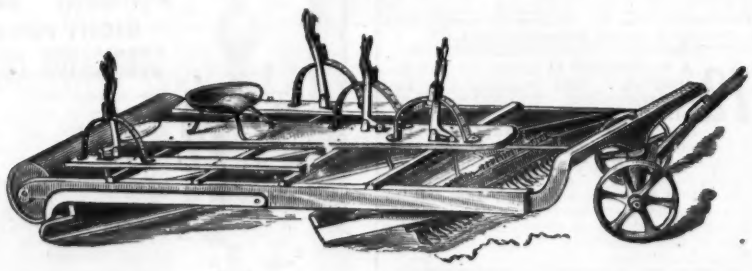

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